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Woods Hole Oceanographic Institution

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HYDROGRAPHIC STATION DATA OBTAINED IN THE VICINITY OF GEORGES BANK, MAY AND AUGUST, 1976

by

R. Limeburner, J. A. Vermersch
and R. C. Beardsley

August 1978

TECHNICAL REPORT

Prepared for the U.S. Geological Survey under Contract 14-08-0001-15615 and for the National Science Foundation under Grant OCE 76-01813.

WOODS HOLE, MASSACHUSETTS 02543

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Approved for Distribution N. P. Fofonoff for
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Dept. of Physical Oceanography

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Abstract

Two extended cruises were made during May and August, 1976, to measure the regional hydrographic structure in the vicinity of Georges Bank on the New England Continental Shelf. A summary of the hydrographic observations made during Cruise E2B76 on the R/V *Eastward* and leg 3 of Cruise 13 on the R/V *Oceanus* are presented in graphic form.

I. Introduction

This report presents preliminary results of two hydrographic cruises made in the Georges Bank region of the New England continental shelf. The principle objectives of the cruises were: (a) to examine the water properties and structure of the shelf/slope front near a NSF-sponsored WHOI moored current meter array located south of Woods Hole, (b) to look for possible overflow through the Great South Channel, and (c) to map the water structure over and around Georges Bank in support of a separate USGS-sponsored moored array experiment being conducted there. The first hydrographic survey was conducted during May 11-21, 1976 on cruise 2B76 of the R/V *Eastward*, and the second survey during August 12-23, 1976 on cruise 13-3 of the R/V *Oceanus*. In general, alternate CTD and XBT stations were taken approximately every 5 nautical miles along a cruise track which zigzagged on and off the continental shelf and Georges Bank. The two cruise tracks are shown in figures 1 and 2 together with station locations, the station numbering scheme, and the regional topography. The *Eastward* cruise track was 1205 nautical miles long and a total of 63 CTD, 36 STD, and 114 XBT stations were made. The *Oceanus* cruise was 1381 nautical miles long, and a total of 110 CTD and 138 XBT profiles were obtained. The STD and CTD data has been edited and analyzed at WHOI and 2 decibar averaged profile data can be obtained with the XBT data in GATE format from the National Oceanographic Data Center, Washington, D. C. 20235.

II. Instrumentation

A. XBT

During the two cruises, a total of 252 Sippican, Inc. T4, T7, T10 XBT's were launched from the port quarter while the R/V *Eastward* and

R/V Oceanus were generally underway at 9 knots and 14 knots respectively. A surface salinity sample was taken at each XBT station and surface temperature was measured with a Hewlett-Packard model 2850C quartz crystal temperature sensor. The manufacturer's specifications for accuracy of the XBT are:

Temperature	±.2°C
Depth	±2% of scale or ±5m
Gradient Response	63% of step in 1m
	95% of step in 5m

B. Calibration Samples

Salinity samples were obtained during each CTD/STD profile at the surface and at depth for calibration using standard Nansen bottles. The procedure was to attach the Nansen bottle 3m above the CTD or STD fish and lower the instrument to within 10m of the bottom for a continuous down profile. The fish was then raised until the Nansen bottle was located in a zone of minimal salinity gradient as estimated from the analog temperature and conductivity down traces. The winch was stopped and 3 to 5 minutes were allowed for the reversing thermometers to equilibrate before the bottle was tripped. The fish was then raised 3m, the three instrument output frequencies measured and logged, and then the fish was brought back to the surface as the up profile was recorded. The Nansen bottle temperature represents the average of 2 protected thermometer measurements and has an estimated accuracy of ±.005°C.

The salinity of the surface and deep water samples was initially determined on board the R/V Eastward using a Guildline model 8400 Auto-Sal Salinometer with a precision of less than ±.001 ‰. The salinometer circulation pump failed during the cruise so the remaining salinity samples

were measured using the WHOI shore salinometer. All salinity samples obtained on the Oceanus cruise were analyzed at WHOI following the cruise.

C. CTD and STD

A Plessy model 9040 CTD fish with a Plessy model 8400 digital data logger was used as the primary profiling instrument on both cruises. An older Plessy model 9040 STD fish was used with the digital data logger as the backup system; some 36 stations were made with this system on the Eastward cruise because of noise in the pressure circuitry of the CTD. Onboard calibration checks of both instruments were made when possible by plotting the temperature and salinity differences between the CTD/STD fish and the Nansen bottle calibration. The CTD was used for the first 7 stations on the Eastward cruise, then the pressure circuitry output started to exhibit 20 decibar amplitude noise. The STD fish was substituted for the next 4 hydrographic stations until a loose connection in the CTD pressure sensor was repaired. The CTD was then used from station 16 to 136, until large noise in the conductivity circuitry occurred. The STD was then used for the remainder of the Eastward cruise. Some sections of the hydrographic profiles obtained on the Eastward cruise were unacceptable because of the above electronic problems. The CTD fish was refurbished after the Eastward cruise and used for all hydrographic stations on the Oceanus cruise even though the temperature sensor was replaced after station 186. A proper assessment of the data quality was made for the NODC files.

D. Navigation

Two Internav Loran-C instruments were continuously monitored on the Eastward cruise, and two Epsco Loran-C instruments were used on the Oceanus cruise. The estimated position error for each station is less than ±.25 nautical miles.

III. Data Analysis

The raw data tapes were first edited for proper header information and file structure using the WHOI computer program "TIDE." A second test of the structural integrity of the data files was made with program "PLSSY" (written by W. Sass) which transcribes the raw data into CTD format and detects any bad scans which are located in the data files. The data was then processed with program "AAA", a multi-level general CTD processing program written by J. Vermersch. This program can be used to (1) apply user-specified calibration constants, (2) correct for sensor time lag, (3) compute salinity, sigma-t and other derived variables, (4) edit up to four variables via first-difference or acceptable range method, and (5) sort the data by pressure to provide a uniform pressure series. The linear corrections determined from the calibration salinity and temperature measurements were then applied to the instrument conductivity and temperature data for the CTD and to salinity and temperature data for the STD. (The calibration results are discussed in the next section and the mean offsets used to correct the CTD or STD data listed in Table 1.) A time lag of 2.5 scans (.625 sec) was used on all station data from both cruises except the data from Eastward cruise stations 41 and 200 where a time lag of 1 scan (.25 sec) was used. Profiles of data associated only with monotonically increasing pressure were created and plotted to indicate the initial data quality of each station. The monotonically increasing pressure profiles indicated "spiking" of the salinity data in areas of strong temperature gradients due to the different time constants associated with the conductivity and temperature sensors of the fish. The spiking effects were minimized by the choice of time-lag given

above, first difference editing of the data, and by pressure sorting at 2 decibar intervals with a least-squares technique which gives the "best" value of each measured or computed variable at the center of each 2-decibar interval. The 2-decibar pressure-sorted data has been submitted in GATE format to NODC and has been used on all subsequent analysis and graphical presentations.

IV. Error Analysis

Table 1 summarizes the mean offsets and standard deviations computed between the Nansen bottle and CTD or STD calibration data. Plots of station number versus offset showed no recognizable calibration drift except near the *Eastward* CTD station 136, which caused the CTD fish to be replaced with the STD fish. The *Oceanus* cruise calibration results are given in 2 parts since a faulty CTD temperature sensor was replaced at station 186. The new temperature sensor was then calibrated at WHOI after the cruise. The conductivity offsets listed in Table 1 were computed from the difference between the fish conductivity value and the conductivity associated with the Nansen bottle temperature, salinity, and pressure values. Thus, the conductivity correction was applied to the data before salinity is computed. An estimate of the inherent instrument noise can be made from the unsorted pressure-increasing profile data taken at stations in the well-mixed water above Georges Bank. Salinity showed a maximum variation of ±.015 ‰. An estimate of the total error in the hydrographic data can be made using the standard deviations of the calibration data. The estimated non-pressure sorted error is given in Table 2.

	Average Offset	Standard Deviation
Eastward CTD		
Temperature	-.034°C	.089°C
Conductivity	.131 mmho/cm	.060 mmho/cm
Eastward STD		
Temperature	.186°C	.117°C
Salinity	-.015 ‰	.037 ‰
Oceanus CTD before station 186		
Temperature	.002°C	.027°C
Conductivity	-.002 mmho/cm	.022 mmho/cm
Oceanus CTD after station 186		
Temperature	.628°C	.045°C
Conductivity	.016 mmho/cm	.016 mmho/cm

Table 1. Results of calibration measurements made on both hydrographic cruises. The mean and standard deviations are given for the differences between the Nansen bottle and the preliminary (i.e., uncorrected) CTD or STD observations.

	Temperature	Salinity	Sigma-t
Eastward Cruise			
CTD	±.089°C	.058 ‰	±.045
STD	±.117°C	.037 ‰	±.027
Oceanus Cruise			
CTD	±.027°C	.021 ‰	±.016
CTD after station 186	±.045°C	.015 ‰	±.012

Table 2. Estimated experimental uncertainty in individual T, S, and σ_t values.

Approximately 75% of the calibration data was within these estimates and 95% of the data was within twice the error bracket. We note that since these error estimates are based on data taken in minimum gradient layers, significantly larger errors will likely occur in regions of sharp temperature and/or salinity gradients. The resulting salinity spiking problem is somewhat reduced by the smoothing associated with the 2-decibar pressure sorting.

V. Hydrographic Data Presentation

The hydrographic data taken on the two cruises are presented here in three different formats, vertical and horizontal section and T/S diagrams. The vertical cross-sections are drawn with contour intervals of 1°C, 2 ‰, and .5 in sigma-t and extend to maximum depths of 240m. The temperature sections show more structure than the salinity and sigma-t sections since the former also incorporate the XBT data which was generally taken between CTD/STD hydrocasts. The vertical sections for each cruise are identified by a single letter, and the lettering scheme for each cruise is shown superimposed on the cruise track in figures 3 and 4. T/S diagrams are shown next for the different vertical sections. Different symbols are used to indicate the beginning and ending of each cast and the T/S values at standard depth points of 10 m, 20 m, 30 m, etc. Horizontal plan-view sections are then presented for each cruise at standard depths 0, 15 m, 30 m, 45 m, 60 m, and 75 m. Temperature and salinity contour intervals are also 1°C and .2 ‰. The Eastward horizontal sections have been complemented

with hydrographic data obtained by the U. S. National Marine Fisheries Service research vessel Albatross IV during a simultaneous May, 1976, bottom water survey in the Gulf of Maine. Only discrete water sample data from the Albatross IV cruise is included with the Eastward data in the horizontal sections and the NMFS data was linearly interpolated to our standard depths when necessary. The NMFS data was kindly made available to us by Drs. W. Wright and R. Schlitz.

A listing of standard station information for both Eastward and Oceanus data sets is also included in Tables 3 and 4 for reference.

Table 3. Station information listing for EASTWARD Cruise. SS means surface water sample taken. ND means the CTD/STD data was not digitally recorded. Station q is named EWD "q" T2.5 in GATE format (e.g., Station 12 is EWD 012T2.5)

Sta. #		Time EST	Lat	Long	Water Depth	SS	XBT	CTD/ STD	Max Depth of Cast
1	May 11	0200	40°59.0	71°10.5	47	√			
2		0230	40°55.5	71°12.5	51	√	√		
3		0330	40°49.2	71°16.5	60	√	√		
4		1740	40°43.0	71°19.5	62	√	√	√	56
5		1930	40°37.0	71°17.5	65	√	√		
6		2020	40°33.0	71°16.1	70	√	√	√	74
7		2128	40°26.8	71°13.9	80	√	√		
8		2230	40°22.5	71°13.5	84	√	√	√	90
9		2340	40°18.0	71°11.0	93	√	√		
10	May 12	0035	40°13.2	71°08.9	116	√	√	√	88
11		0135	40°08.9	71°07.8	141	√	√		
12		0213	40°04.6	71°06.3	191	√	√	√	168
13		0326	40°00.6	71°04.0	298	√	√		
14		0416	39°56.0	71°03.4	519	√	√	√	396
15		1303	39°56.0	71°03.4	518	√		√	76
16		2131	39°56.0	71°03.4	518			√	96
17		2155	39°56.0	71°03.4	518	√		√	204
18		2322	39°50.7	71°04.0	823	√	√		
19	May 13	0030	39°45.9	71°00	1683	√	√	√	192
20		0130	39°41.1	70°58.5	∿2000	√	√		
21		0305	39°36.2	70°57.2	2330	√	√	√	188
22		0332	39°31.9	70°55.5	2380	√	√		
23		0415	39°26.1	70°53.4	2430	√	√	√	194
24		0515	39°22	70°52	2545	√	√		
25		0650	39°16.9	70°50	2660	√	√	√	218
26		1550	39°16.8	70°49.8	2675			ND	
27		1940	39°25.0	70°45	2530	√	√		
28		2035	39°31.3	70°36	2410	√	√		
29		2130	39°36.5	70°28.8	2200	√	√		
30		2218	39°42.5	70°22.5	2000	√	√		
31		2250	39°47	70°22	1750	√	√		
32		2336	39°53.5	70°21	730	√	√	√	192
33	May 14	0045	39°58	70°20	685	√	√		
34		0120	40°02.5	70°20	173	√	√	√	160
35		0220	40° 7.6	70°20	117	√	√		
36		0312	40°12.8	70°19.5	105	√	√	√	100
37		0405	40°18	70°19.1	92	√	√		
38		0453	40°22.4	70°19.3	83	√	√	√	74
39		0615	40°30	70°18	65	√	√		
40		0714	40°35	70°17.9	60	√	√	√	56
41		0820	40°39.2	70° 9.2	48	√	√		
42		0847	40°41.3	70° 4.3	45	√	√		
43		0931	40°43.1	70°00.1	43	√	√	√	42
44		1030	40°39.7	69°56.4	51	√	√		
45		1127	40°35.1	69°52.0	62	√	√	√	56
46		1207	40°31.5	69°48	69	√	√		

Table 3 (Contd)

Sta. #		Time EST	Lat	Long	Water Depth	SS	XBT	CTD/ STD	Max Depth of Cast
47	May 14	1250	40°28	69°44.5	72	✓	✓	✓	68
48		1339	40°24	69°40	69	✓	✓		
49		1416	40°20.5	69°35.5	73	✓	✓	✓	68
50		1501	40°16.9	69°32.1	76	✓	✓		
51		1553	40°13	69°28	84	✓	✓	✓	80
52		1630	40°8.5	69°27	81	✓	✓		
53		1720	40°03	69°28	101	✓	✓	✓	96
54		1813	39°58	69°27	123	✓	✓		
55		2150	39°53	69°25	1703	✓	✓	✓	400
56	May 15	0440	39°48.6	69°25	1813	✓	✓		
57		0546	39°43.5	69°24.2	2018	✓		✓	286
58		0900	39°55.3	69°55.1	1930	✓	✓		
59		1154	40°06.5	68°27.5	1230	✓		✓	180
60		1257	40°10.5	68°30.0	560	✓	✓		
61		1355	40°14.6	68°33.7	188	✓		✓	170
62		1445	40°19.5	68°35	104	✓	✓		
63		1535	40°24.4	68°36.8	93	✓		✓	82
64		1712	40°29.5	68°39.4	81	✓	✓		
65		1834	40°33.2	68°42.5	67	✓		✓	64
66		1972	40°33.7	68°48.8	70	✓	✓		
67		2001	40°34.3	68°55.7	73	✓		✓	72
68		2042	40°34.7	69°02	68	✓	✓		
69		2131	40°34.7	69°07.3	83	✓		✓	84
70		2215	40°34.9	69°14.5	64	✓	✓		
71		2313	40°35.0	69°21.7	59	✓		✓	60
72		2350	40°35.1	69°26.5	55	✓	✓		
73	May 16	0017	40°35.4	69°31.5	59	✓		✓	58
74		0318	40°49.3	69°18.9	58	✓		✓	54
75		0455	40°49.1	69°08.5	70	✓	✓	✓	62
76		0617	40°49.2	69°02.5	76	✓		✓	76
77		0743	40°49.1	68°56	73	✓		✓	74
78		0830	40°48.9	68°50.5	69	✓	✓		
79		0905	40°49	68°45	67	✓		✓	68
80		0957	40°49.8	68°40	59	✓	✓		
81		1032	40°50.6	68°34	58	✓		✓	68
82		1117	40°55	68°36.8	58	✓	✓		
83		1145	40°59.5	68°39.6	44	✓	✓		
84		1224	41°04.6	68°42.1	65	✓		✓	72
85		1300	41°05	68°46.9	68	✓	✓		
86		1333	41°4.2	68°51.1	72	✓		✓	78
87		1409	41°4.1	68°55	85	✓	✓		
88		1452	41°4.5	69°00.0	91	✓		✓	118
89		1522	41°4.1	69°04.2	83	✓	✓		
90		1552	41°4.6	69°07.7	75	✓		✓	70
91		1632	41°4.4	69°11.8	58	✓	✓		
92		1655	41°4.0	69°16.2	57	✓	✓		
93		1732	41°3.9	69°21.8	45	✓		✓	42
94		1913	41°13	69°25	42	✓	✓		
95		2042	41°20.7	69°34.3	27	✓		✓	22

Table 3 (Contd)

Sta. #		Time EST	Lat	Long	Water Depth	SS	XBT	CTD/ STD	Max Depth of Cast
96	May 16	2145	41°22	69°26.9	35	✓		✓	28
97		2255	41°25.2	69°17.2	100	✓		✓	96
98	May 17	0015	41°27	69°10.1	157	✓		✓	146
99		0105	41°24.5	69°3.1	145		✓		
100		0140	41°31.3	68°57.3	154	✓		✓	142
101		0231	41°30	68°53	135		✓		
102		0300	41°29.2	68°47.5	150	✓		✓	138
103		0345	41°28	68°42.9	130		✓		
104		0430	41°27	68°37.5	97	✓		✓	92
105		0501	41°24.3	68°35	86	✓	✓		
106		0550	41°20	68°29.5	66	✓		✓	62
107		0648	41°14.4	68°23.7	57	✓			
108		0724	41°9.7	68°18.6	40	✓	✓		
109		0805	41°5.6	68°14.5	46	✓		✓	42
110		0850	41°2.3	68°11.2	44	✓	✓		
111		0940	40°57.8	68°06.0	42	✓	✓		
112		1330	40°00.7	68°4	51	✓		✓	50
113		1445	40°53.8	68°01.1	52	✓		✓	50
114		1530	40°49.1	67°59	69	✓	✓		
115		1618	40°44.5	67°56	77	✓		✓	72
116		1658	40°39.5	67°53.5	83	✓	✓		
117		1740	40°36	67°52	90	✓		✓	86
118		1830	40°31	67°49	120	✓	✓		
119		1930	40°26	67°46	142	✓	✓	✓	132
120		2131	40°21.1	67°43.5	225	✓	✓		
121		2104	40°17.2	67°41	1040	✓	✓	✓	394
122		2254	40°20.2	67°28.2	490	✓	✓		
124		0035	40°21.6	67°16.6	1493	✓	✓	✓	386
125		0113	40°24.8	67°16.1	828	✓	✓		
126		0137	40°28.2	67°18	207	✓	✓		
127		0216	40°31.2	67°19.1	143	✓		✓	136
128		0249	40°34.3	67°20.5	123	✓	✓		
129		0316	40°38	67°21.9	100	✓	✓		
130		0404	40°42	67°22.2	98	✓		✓	92
131		0509	40°46.7	67°24.2	92	✓	✓		
132		0607	40°51.2	67°25	86	✓		✓	84
133		0827	40°56	67°27	75	✓	✓		
134		0915	41°01	67°27.5	69	✓		✓	72
135		0954	41°4.5	67°29	61	✓	✓		
136		1045	41°10.5	67°31	53	✓		✓	50
137		1138	41°17	67°36.5	48	✓	✓		
138		1230	41°24	67°34	39	✓		✓	40
139		1539	41°15.9	67°14.7	57	✓	✓		
140		1636	41°11.2	67°07.2	66	✓	✓		
141		1805	41°6.9	66°57	70	✓		✓	60
142		1900	41°3.3	66°49.1	68	✓	✓		
143		2008	41°00.2	66°41.6	81	✓		✓	74
144		2040	40°58	66°38.2	98	✓	✓		
145		2116	40°56.8	66°35.3	120	✓		✓	90

Table 3 (Contd)

Sta. #		Time EST	Lat	Long	Water Depth	SS	XBT	CTD/ STD	Max Depth of Cast
146	May 17	2158	40°54.7	66°35	623	√	√		
147		2310	40°52.5	66°25.4	1788	√		√	492
148	May 18	0045	41°00.5	66°17.0	1783	√	√		
149		0139	41°8.5	66°9	1590	√	√		
150		0232	41°16.5	66°2.0	1700	√	√		
151		0300	41°21	66°04.0	330	√	√		
152		0330	41°25	66°06	134	√	√		
153		0356	41°29	66°7.5	112	√	√		
154		0431	41°34	66°10.5	97	√	√		
155		0449	41°36.8	66°13.0	94	√	√	√	88
156		0642	41°46	66°2	100	√	√		
157		0805	41°54.4	65°51.5	135	√	√		
158		0845	41°58	65°46.8	239	√	√		
159		1022	42°1.2	65°41.8	367	√		√	292
160		1132	42°6.2	65°37.3	330	√	√		
161		1230	42°10	65°31.5	118	√		√	104
162		1315	42°15.5	65°33.5	110	√	√		
163		1359	42°19.8	65°36.1	99	√		√	94
164		1448	42°17.6	65°41.5	121	√	√		
165		1603	42°14.5	65°45.5	209	√		√	198
166		1711	42°11.8	65°49.1	∿220	√	√		
167		1754	42°10	65°52.1	238	√		√	182
168		1842	42°8.2	65°55	1225	√	√		
169		1935	42°5.9	65°59	228	√		√	184
170		2054	42°2.5	66°2.5	98	√	√		
171		2130	41°59.5	66°7.0	97	√		√	82
172		2218	41°57	66°11	90	√	√		
173		2315	41°54	66°19	85	√		√	76
174	May 20	0000	41°51.3	66°24.7	85	√	√		
175		0038	41°51	66°33.9	75	√	√		
176		0124	41°50.5	66°41.4	67	√	√		
177		0230	41°50.1	66°51.1	65	√	√		
178		0345	41°50.6	67°7.8	59	√	√		
179		0515	41°57.1	67°14.9	61	√		√	52
180		0618	42°01.7	67°17.2	52	√	√		
181		0705	42°6.8	67°22	74	√		√	50
182		0747	42°9.9	67°24	191	√	√		
183		0831	42°13	67°26.5	238	√		√	220
184		1024	42°9.8	67°39.9	188	√	√		
185		1211	42°6.3	67°52.4	207	√		√	182
186		1317	42°3.0	67°50.5	179	√		√	156
187		1344	42°01	67°48.5	164	√	√		
188		1355	41°59	67°47.5	81	√		√	74
189		1646	41°56	67°44.2	46	√		√	34
190		1732	41°52.5	67°41.3	39	√	√		
191		1906	41°46.5	67°53.5	37	√	√		
192		2045	41°41.9	68°6.1	38	√	√	√	32
193		2130	41°45	68°9.5	51	√	√		
194		2204	41°47.6	68°11.3	82	√		√	80
195		2310	41°51.1	68°15.2	193	√		√	178

Table 3 (Contd)

Sta. #		Time EST	Lat	Long	Water Depth	SS	XBT	CTD/ STD	Max Depth of Cast
196	May 21	0005	41°55	68°19.2	203	√		√	186
197		0059	41°58	68°22	177	√	√		
198		0140	42°01.5	68°25.2	180	√		√	158
199		0242	41°59.1	68°33.7	170	√	√		
200		0335	41°57.7	68°41.3	166	√		√	82
201		0445	41°55.2	68°50	144	√	√		
202		0551	41°52.9	68°58	163	√		√	148
203		0700	41°50.6	68°06	178	√	√		
204		0745	41°48.6	68°13.6	201	√	√		
205		0840	41°45	68°22	179	√		√	164
206		0931	41°43.8	68°29.2	168	√	√		
207		1020	41°41.5	68°35.0	136	√		√	122
208		1047	41°40.5	68°37.9	88	√	√		
209		1100	41°34.8	69°40.5	73	√		√	66
210		1131	41°39	69°43	54	√	√		
211		1145	41°38	69°45.5	35	√		√	32
212		1220	41°37.0	69°48.5	24	√	√		
213		1238	41°36	69°51	18	√		√	20
214		1345	41°32.5	69°59.3	24	√			
215		1520	41°27.8	70°13.5	20	√			
216		1720	41°29.5	70°36.0	20	√			

Table 4. Station information listing for OCEANUS cruise. SS means surface water sample taken. ND means the CTD/STD data was not digitally recorded. Station "q" is named 013 "q" T2.5 in GATE format (e.g., station 15 is 013 015 T2.5).

HYDROGRAPHIC STATIONS

Sta. #		Time EST	Lat	Long	Water Depth	SS	XBT	CTD STD	Max Depth of Cast
1	Aug 12	2155	41°17.6	71°00	41	✓	✓		
2		2230	41°09.7	71°01	36	✓	✓		
3		2310	41°01.3	71°04.1	47	✓	✓	✓	44
4	Aug 13	0135	40°57.0	71°02.9	52	✓	✓		
5		0210	40°51.5	71°06.0	59	✓		✓	54
6		0305	40°45.9	71°07.0	58	✓	✓		
7		0330	40°40.6	71°08.3	61	✓		✓	54
8		0421	40°36.3	71°09.0	~70	✓	✓		
9		0445	40°30.9	71°10.5	74	✓		✓	66
10		0608	40°26.3	71°11.0	81	✓	✓		
11		0653	40°22.4	71°13.3	85	✓		✓	72
12		0801	40°17.1	71°09.5	96	✓	✓		
13		0822	40°13.2	71°08.1	119	✓		✓	92
14		0927	40°07.9	71°06.4	150	✓	✓		
15		0945	40°04.2	71°05.3	195	✓		✓	174
16		1155	39°59.7	71°03.5	330	✓	✓		
17		1300	39°56.2	71°03.5	480	✓		✓	192
18		1445	39°56.6	70°48.9	450	✓	✓		
19		1540	39°57.0	70°33.4	~420	✓	✓		
20		1618	39°59.5	70°23.0	265	✓		✓	194
21		1813	40°04.5	70°23.3	153	✓	✓		
22		1841	40°10.3	70°25.0	121	✓		✓	112
23		2025	40°14.9	70°25.3	107	✓	✓		
24		2055	40°20.3	70°24.5	90	✓		✓	84
25		2200	40°25.5	70°24.1	75	✓	✓		
26		2220	40°29.7	70°24.6	69	✓			
27		2325	40°34.6	70°23.6	61	✓	✓		
28		2350	40°40.0	70°23.7	55	✓		✓	48
29	Aug 14	0053	40°44.8	70°23.5	50	✓	✓		
30		0123	40°50.3	70°25.4	51	✓		✓	44
31		0231	40°54.4	70°19.9	~42	✓	✓		
32		0300	40°58.9	70°14.9	33	✓		✓	22
33		0358	40°55.3	70°11.1	29	✓	✓		
34		0420	40°51.5	70°08.2	30	✓		✓	18
35		0505	40°47.1	70°04.2	30	✓	✓		
36		0530	40°42.5	70°00.6	43	✓		✓	32
37		0614	40°39.0	69°55.9	53	✓	✓		
38		0635	40°35.2	69°52.1	61	✓		✓	56
39		0739	40°30.4	69°47.6	60	✓	✓		
40		0757	40°27.0	69°44.5	70	✓		✓	68
41		0910	40°22.0	69°40.0	~72	✓	✓		
42		0930	40°19.4	69°36.5	73	✓		✓	68
43		1025	40°14.9	69°32.5	80	✓	✓		
44		1045	40°10.7	69°28.5	87	✓		✓	84
45		1204	40°05.3	69°23.5	96	✓	✓		
46		1217	40°03.0	69°20.5	102	✓		✓	96
47		1354	~39°57.0	~69°15.0	315	✓	✓		
48		1433	39°51.2	69°09.8	1505	✓		✓	182

Table 4 (Contd)

Sta. #		Time EST	Lat	Long	Water Depth	SS	XBT	CTD/ STD	Max Depth of Cast
49	Aug 14	1600	∿39°56.1	∿68°55.0	1625	√	√		
50		1653	40.00.5	68°41.0	1920	√		√	170
51		1840	40°06.0	68°38.5	∿300	√	√		
52		1903	40°12.5	68°37.5	160	√		√	150
53		1958	40°17.8	68°36.2	113	√	√		
54		2025	40°21.8	68°36.9	89	√		√	80
55		2136	40°27.7	68°36.3	∿88	√	√		
56		2210	40°34.5	68°36.1	70	√		√	62
57	Aug 15	0120	40°42.8	68°36.2	61	√	√		
58		0133	40°45.4	68°34.7	60	√		√	54
59		0243	40°47.2	68°42.7	64	√	√		
60		0307	40°47.1	68°48.1	65	√		√	58
61		0356	40°48.3	68°54.6	67	√	√		
62		0418	40°49.4	68°59.9	77	√		√	68
63		1124	40°51.0	69°06.2	∿71	√	√		
64		1147	40°51.9	69°12.5	67	√		√	58
65		1308	40°54.0	69°20.3	∿47	√	√		
66		1330	40°53.5	69°24.4	45	√		√	40
67		1443	40°54.8	69°29.8	∿37	√	√		
68		1508	40°54.8	69°36.2	39	√	√	√	34
69		1600	40°56.0	69°42.3	∿31	√	√		
70		1617	40°56.5	69°46.7	35	√		√	32
71		1736	40°51.4	69°36.3	40	√	√		
72		1810	40°46.5	69°28.2	47	√	√		
73		1828	40°44.3	69°24.0	∿43	√	√		
74		1850	40°44.2	69°17.8	47	√	√		
75		1904	40°45.5	69°14.4	62	√	√		
76		1940	40°51.9	69°13.9	66	√	√		
77		2011	40°58.0	69°13.6	69	√	√		
78		2052	41°05.0	69°18.8	52	√		√	48
79		2143	41°10.5	69°23.1	50	√	√		
80		2227	41°18.6	69°25.8	39	√		√	36
81		2320	41°19.8	69°22.0	∿51	√	√		
82		2327	41°20.0	69°19.2	85	√	√		
83		2347	41°20.0	69°14.5	104	√	√		
84		2352	41°20.0	69°11.3	125	√		√	118
85	Aug 16	0116	41°22.0	69°04.5	∿158	√	√		
86		0150	41°20.8	68°55.8	145	√		√	138
87		0244	41°22.2	68°49.0	128	√	√		
88		0308	41°23.6	68°41.0	102	√		√	96
89		0424	41°20.0	68°36.0	73	√	√		
90		0455	41°16.1	68°31.8	57	√		√	52
91		0603	41°12.1	68°27.0	55	√	√		
92		0626	41°07.9	68°21.9	47	√		√	40
93		0737	41°04.1	68°17.5	43	√	√		
94		0815	40°58.5	68°11.8	56	√		√	50
95		0937	40°54.9	68°04.8	63	√	√		

Table 4 (Contd)

Sta. #		Time EST	Lat	Long	Water Depth	SS	XBT	CTD/ STD	Max Depth of Cast
96	Aug 16	1003	40°52.3	67°59.0	59	✓		✓	50
97		1107	40°47.4	67°57.0	72		✓		
98		1137	40°43.2	67°55.2	79	✓		✓	74
99		1247	40°38.3	67°52.9	86	✓	✓		
100		1305	40°34.0	67°49.2	93	✓		✓	86
101		1410	40°29.8	67°47.5	∿121	✓	✓		
102		1437	40°24.0	67°44.9	141	✓		✓	132
103		1546	40°20.0	67°42.0	∿450	✓	✓		
104		1607	40°15.8	67°40.4	1200	✓		✓	190
105		1837	40°17.8	67°25.8	1200	✓	✓		
106		1915	40°18.2	67°15.7	1120	✓		✓	200
107		2020	40°25.2	67°15.1	∿732	✓	✓		
108		2044	40°28.9	67°18.0	143	✓		✓	126
109		2230	∿40°36.0	∿67°22.0	105	✓	✓		
110		2257	40°41.5	67°23.4	97	✓		✓	86
111		2346	40°46.5	67°24.0	92	✓	✓		
112	Aug 17	0005	40°50.9	67°25.1	87	✓		✓	82
113		0852	40°56.5	67°26.0	∿78	✓	✓		
114		0918	41°01.7	67°26.0	67	✓		✓	62
115		1010	41°05.9	67°27.5	∿62	✓	✓		
116		1041	41°10.8	67°27.5	47	✓		✓	48
117		1130	41°15.0	67°31.5	∿48	✓	✓		
118		1153	41°18.5	67°32.2	43	✓		✓	40
119		2128	41°28.8	67°36.8	35	✓		✓	32
120		2230	41°32.2	67°25.0	54	✓	✓		
121		2314	41°37.6	67°15.6	47	✓		✓	40
122	Aug 18	0018	41°32.8	67°13.4	53	✓	✓		
123		0040	41°29.8	67°08.5	57	✓		✓	52
124		0148	41°25.2	67°05.6	61	✓	✓		
125		0215	41°21.1	67°00.2	66	✓		✓	64
126		0320	41°16.5	66°56.6	70	✓	✓		
127		0340	41°13.2	66°52.5	72	✓		✓	66
128		0500	41°08.0	66°47.9	72	✓	✓		
129		0525	41°04.7	66°44.5	77	✓		✓	72
130		0640	41°00.2	66°41.5	∿80	✓	✓		
131		0703	40°56.0	66°37.9	105	✓		✓	98
132		0813	40°51.5	66°34.2	∿549	✓	✓		
133		0836	40°48.5	66°31.0	1800	✓		✓	204
134		1123	40°54.2	67°01.0	87	✓	✓		
135		1217	40°50.3	67°15.0	92	✓	✓		
136		1259	40°46.8	67°27.5	88	✓	✓		
137		1340	40°41.4	67°38.5	79	✓	✓		
138		1422	40°40.0	67°50.7	81	✓	✓		
139		1505	40°39.1	68°05.0	88	✓	✓		
140		1546	40°37.8	68°16.0	84			✓	76
141		1654	40°32.4	68°30.0	82	✓	✓		
142		1725	40°28.2	68°37.1	85	✓		✓	76
143		1827	40°25.0	68°47.1	81	✓	✓		
144		1915	40°23.9	68°57.8	85	✓		✓	78
145		2055	40°20.0	69°06.4	90	✓	✓		

Table 4 (Contd)

Sta. #		Time EST	Lat	Long	Water Depth	SS	XBT	CTD/ STD	Max Depth of Cast
146	Aug 18	2114	40°18.6	69°13.4	89	√		√	80
147		2255	40°15.4	69°24.3	81	√	√		
148		2330	40°15.4	69°33.0	79	√		√	76
149	Aug 19	0018	40°16.1	69°40.8	∿79	√	√		
150		0046	40°17.5	69°49.6	83	√		√	76
151		0130	40°18.6	69°58.9	∿86	√	√		
152		0156	40°19.4	70°07.3	87	√		√	76
153		0235	40°19.6	70°16.0	∿88	√	√		
154		0304	40°30.4	70°28.2	90	√		√	84
155		0400	40°12.9	70°29.9	∿115	√	√		
156		0430	40°06.1	70°33.5	∿135	√	√		
157		0500	40°00.0	70°36.5	255		√		
158		0530	39°53.5	70°40.0	500		√		
159	Aug 20	1727	41°04.2	66°21.2	780	√		√	198
160		1823	41°08.1	66°23.2	∿146	√	√		
161		1855	41°11.5	66°23.2	98	√		√	90
162		2015	41°15.8	66°24.5	99	√	√		
163		2037	41°19.8	66°25.4	94	√		√	78
164		2120	41°24.0	66°28.1	75	√	√		
165		2144	41°28.0	66°30.0	89	√		√	80
166		2230	41°33.2	66°31.9	85	√	√		
167		2257	41°37.6	66°34.0	70	√		√	
168	Aug 21	0011	41°37.5	66°24.8	81	√	√		
169		0043	41°38.5	66°18.8	87	√		√	84
170		0125	41°38.4	66°11.0	97	√	√		
171		0155	41°39.0	66°04.2	94	√	√	√	84
172		0248	41°39.7	65°57.0	110	√	√		
173		0314	41°41.3	65°49.0	225	√		√	196
174		0420	41°41.0	65°42.0	∿1640	√	√		
175		0442	41°41.3	65°36.1	1830	√		√	196
176		0600	41°49.6	65°25.2	1900	√	√		
177		0640	41°55.0	65°16.0	∿1845	√	√		
178		0705	41°58.8	65°20.0	1550	√	√		
179		0722	42°03.5	65°24.0	1075	√		√	194
180		0812	42°06.7	65°27.8	∿500	√	√		
181		0832	42°10.0	65°30.3	120	√		√	108
182		0909	42°12.6	65°34.0	115	√	√		
183		1019	42°15.0	65°37.3	113	√	√		
184		1057	42°12.8	65°46.8	224	√	√		
185		1447	42°11.7	65°52.5	240	√	√		
186		1915	42°06.7	66°00.0	213	√		√	200
187		2044	42°12.0	65°49.2	240	√		√	200
188		2141	42°09.5	65°55.3	∿220	√	√		
189		2205	42°07.0	66°01.5	209	√	√		
190		2225	42°04.8	66°06.1	96	√	√		

Table 4 (Contd)

Sta. #		Time EST	Lat	Long	Water Depth	SS	XBT	CTD/ STD	Max Depth of Cast
191	Aug 21	2315	42°02.0	66°10.8	93	✓		✓	88
192	Aug 22	0001	41°58.8	66°16.7	83	✓	✓		
193		0021	41°57.2	66°20.4	83	✓		✓	74
194		0144	41°55.1	66°29.2	85	✓	✓		
195		0202	41°54.2	66°34.1	74	✓		✓	70
196		0306	41°51.2	66°40.4	69	✓	✓		
197		0326	41°49.0	66°45.5	65	✓		✓	60
198		0435	41°49.7	66°53.4	65	✓	✓		
199		0459	41°50.0	67°00.5	64	✓		✓	56
200		0550	41°52.7	67°03.1	60	✓	✓		
201		0604	41°55.5	67°05.2	58	✓		✓	50
202		0657	41°59.2	67°06.6	57	✓	✓		
203		0718	42°03.6	67°09.0	41	✓		✓	36
204		0816	42°07.5	67°11.3	63	✓	✓		
205		0940	42°10.0	67°14.0	155	✓		✓	146
206		0926	42°10.8	67°12.5	155		✓		
207		0929	42°10.8	67°12.5	155		✓		
208		1000	42°14.8	67°16.8	245	✓	✓		
209		1015	42°17.7	67°20.1	285	✓		✓	250
210		1235	42°16.0	67°28.2	268	✓	✓		
211		1301	42°14.9	67°35.0	245	✓		✓	198
212		1448	42°12.6	67°44.0	~220	✓	✓		
213		1517	42°10.0	67°50.1	215	✓		✓	206
214		1610	42°07.6	67°49.2	205	✓	✓		
215		1626	42°04.9	67°48.5	193	✓		✓	174
216		1736	42°01.9	67°47.2	165	✓	✓		
217		2035	42°01.0	67°47.5	115	✓		✓	106
218		2325	41°58.1	67°46.4	57	✓	✓		
219	Aug 23	0117	41°54.8	67°46.2	41	✓	✓		
220		0130	41°52.2	67°45.1	35	✓		✓	30
221		0201	41°49.8	67°44.1	36	✓	✓		
222		0216	41°46.8	67°42.4	36	✓		✓	32
223		0322	41°46.8	67°51.1	35	✓	✓		
224		0349	41°42.0	67°55.2	29	✓		✓	22
225		0435	41°42.5	68°04.6	35	✓	✓		
226		0456	41°43.0	68°10.0	33	✓		✓	34
227		0542	41°45.0	68°11.1	51	✓	✓		
228		0557	41°45.2	68°15.7	73	✓		✓	70
229		0648	41°47.6	68°18.1	139	✓	✓		
230		0706	41°50.0	68°21.3	219	✓		✓	200
231		0820	41°52.4	68°23.0	205	✓	✓		
232		0843	41°54.9	68°27.1	183	✓		✓	178
233		1035	41°53.8	68°35.4	174	✓	✓		
234		1100	41°51.1	68°41.3	165	✓		✓	156
235		1150	41°50.0	68°47.4	171	✓	✓		
236		1220	41°49.3	68°54.8	166	✓		✓	156
237		1336	41°47.0	69°02.5	165	✓	✓		
238		1357	41°46.2	69°07.0	182	✓		✓	172
239		1446	41°44.9	69°13.8	197	✓	✓		
240		1508	41°44.0	69°20.8	176	✓		✓	158

Table 4 (Contd)

Sta. #		Time EST	Lat	Long	Water Depth	SS	XBT	CTD/ STD	Max Depth of Cast
241	23 Aug	1623	41°41.7	69°26.5	150	√	√		
242		1652	41°39.1	69°32.8	92	√		√	86
243		1719	41°37.8	69°35.8	∿80	√	√		
244		1733	41°36.8	69°39.0	57	√		√	54
245		1800	41°36.2	69°41.7	41	√	√		
246		1808	41°35.2	69°43.2	32	√		√	32
247		1915	41°31.1	69°40.3	∿28	√	√		
248		1933	41°26.0	69°43.5	21			√	14
249		2018	41°24.6	69°55.5	∿20		√		
250		2139	41°27.2	70°17.3	∿18	√	√		

VI. Acknowledgements

Cruise E2B76 of the R/V Eastward was supported in part by the U. S. Geological Survey under contract 14-08-0001-15615 and in part by the National Science Foundation under grant OCE76-01813 and B. Butman from the USGS and R. Beardsley from WHOI served as co-chief scientists. Other scientific personnel included M. Noble and A. Eliason from the USGS, J. Vermersch from WHOI, W. Brown, E. LaCoursier, and W. Behen from the University of New Hampshire, and C. Patton, D. Grill, R. Hautsch, and R. Shepherd from Brookhaven National Laboratory. The USGS supplied the CTD fish, hydro winch, and deck unit while WHOI supplied the STD fish. In addition to the hydrographic work reported here, four bottom moorings were deployed by the University of New Hampshire group and a surface nutrient mapping program was successfully carried out by the Brookhaven group.

Leg 3 of Cruise 13 of the R/V Oceanus was supported in part by the USGS under contract 14-08-0001-15615 and in part by the National Science Foundation under grant OCE76-01813. D. Folger and B. Butman from the USGS and R. Beardsley from WHOI served as co-chief scientists. Other scientific personnel included M. Noble, A. Eliason, M. Bothner, and R. Fabro from the USGS, J. Vermersch, J. Milliman, C. Parmenter, F. Faller, and R. Limeburner from WHOI. The USGS hydrographic profiling equipment was

used. In addition, several USGS current meter moorings were recovered and one deployed, and one University of New Hampshire bottom mooring recovered. A suspended sediment program involving transmission profiling and water sampling was also conducted.

The skill and competence of the officers and crews of both research vessels contributed significantly to the success of the two cruises. Their help is gratefully acknowledged.

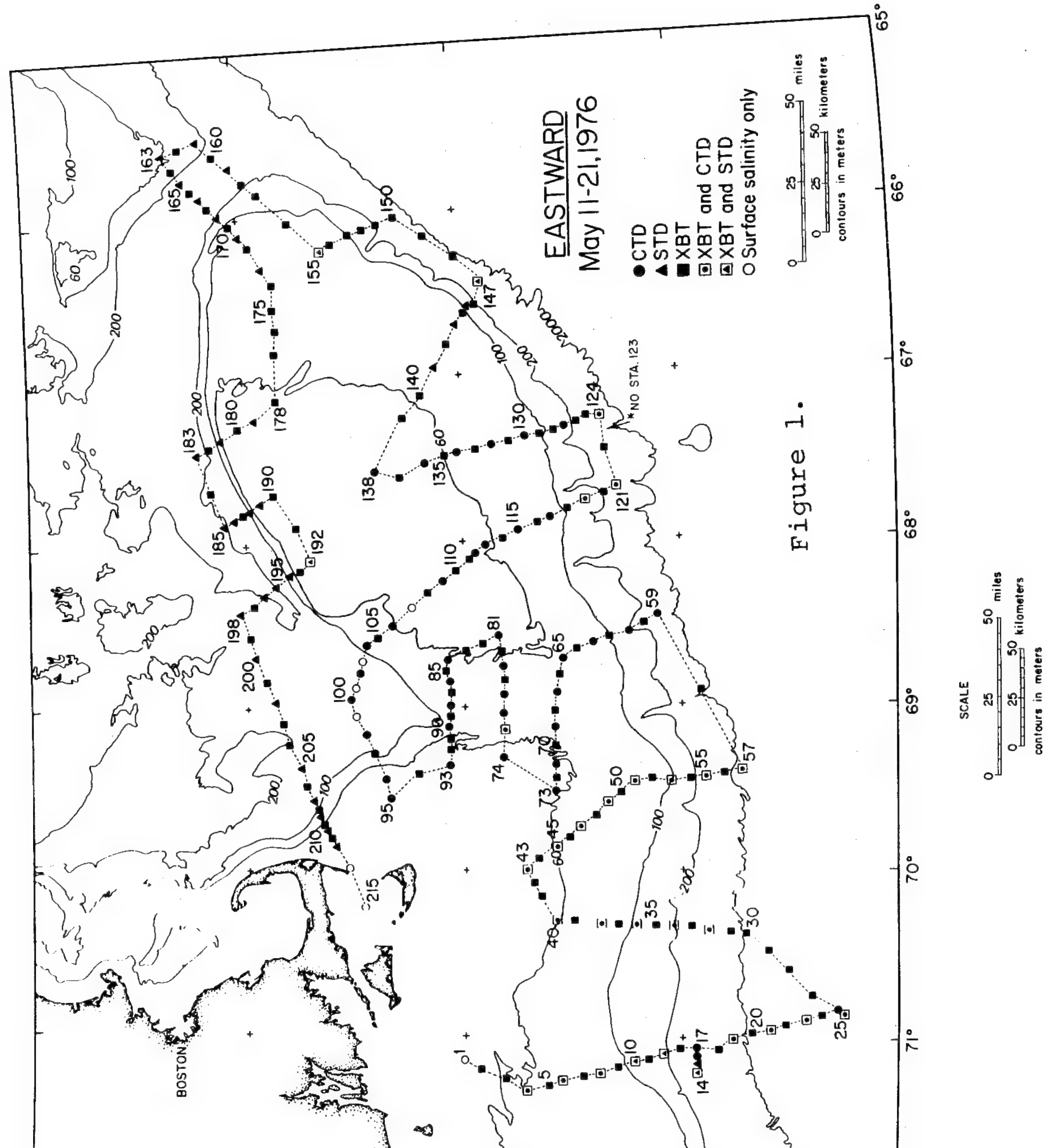

EASTWARD
May 11-21,1976
CTD
STD
XBT
XBT and CTD
XBT and STD
Surface salinity only
0 25 50 miles
0 25 50 kilometers
contours in meters
SCALE
BOSTON
NO STA. 123
43°
42°
41°
40°
39°
72°
71°
70°
69°
68°
67°
66°
65°

Figure 1.

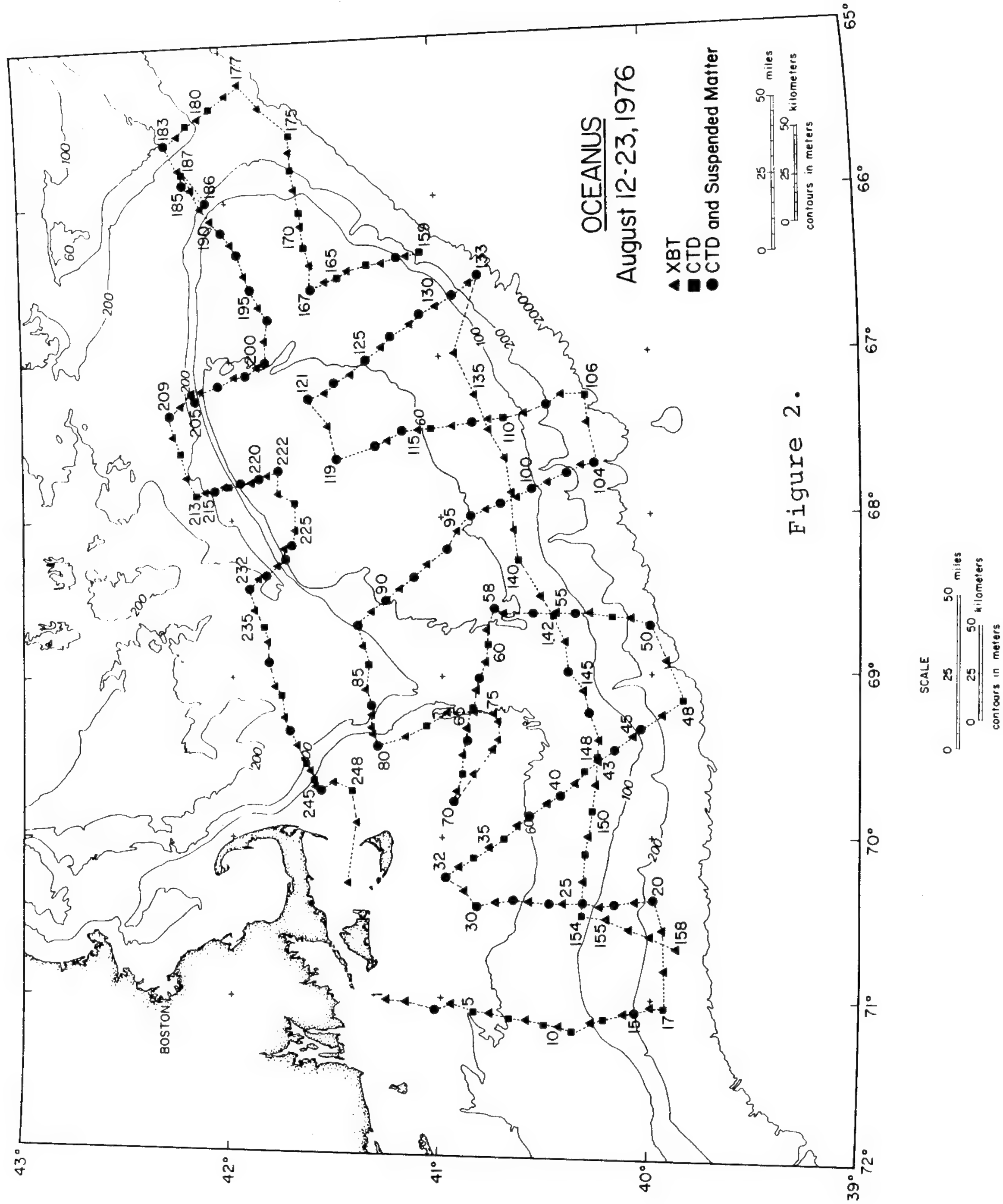

OCEANUS
August 12-23, 1976
XBT
CTD
CTD and Suspended Matter
contours in meters
miles
kilometers
SCALE
BOSTON
43°
42°
41°
40°
39°
72°
71°
70°
69°
68°
67°
66°
65°

Figure 2.

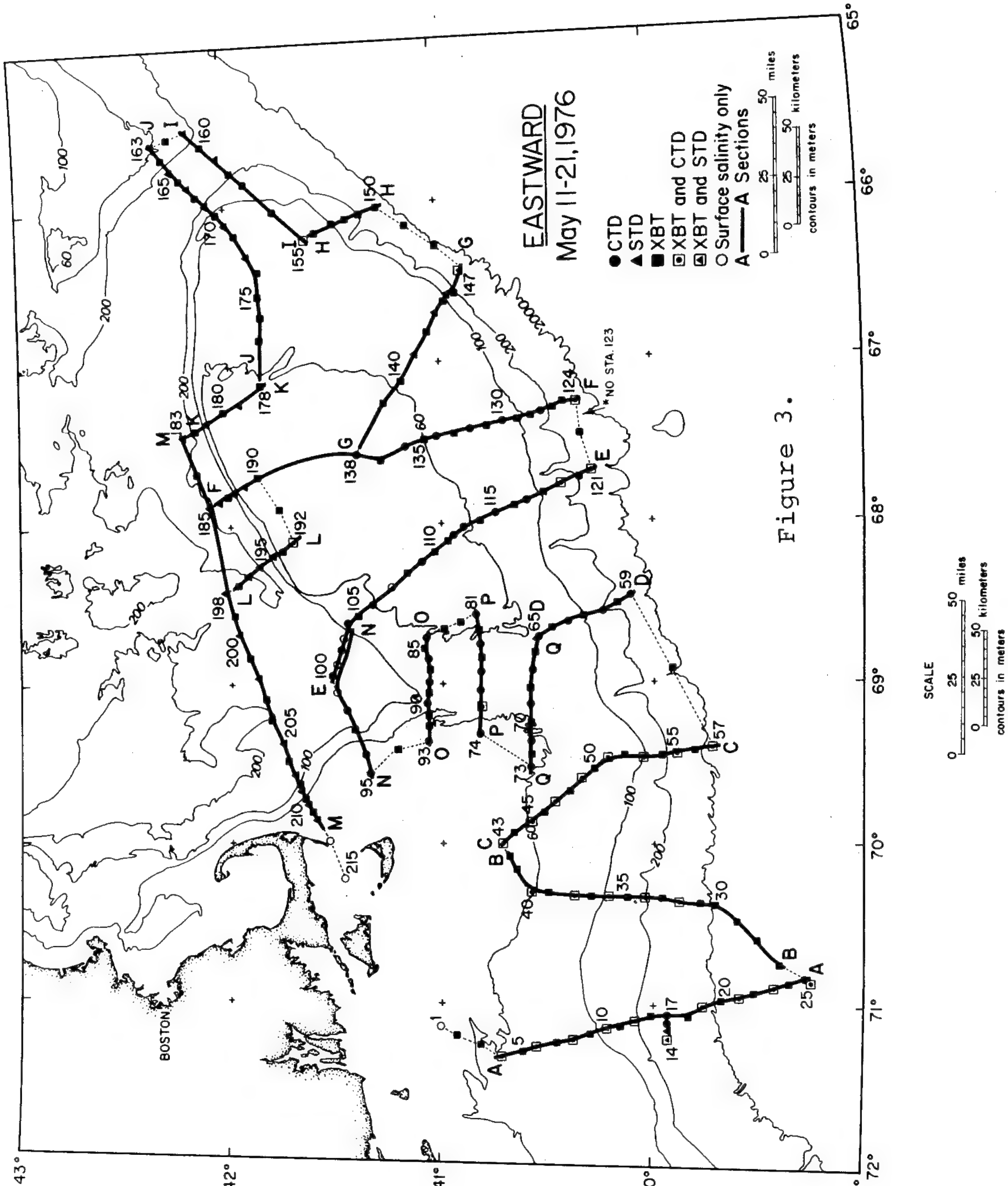

EASTWARD
May 11-21,1976
CTD
STD
XBT
XBT and CTD
XBT and STD
Surface salinity only
A——A Sections
miles
kilometers
contours in meters
SCALE
BOSTON
NO STA. 123
43°
42°
41°
40°
39°
72°
71°
70°
69°
68°
67°
66°
65°

Figure 3.

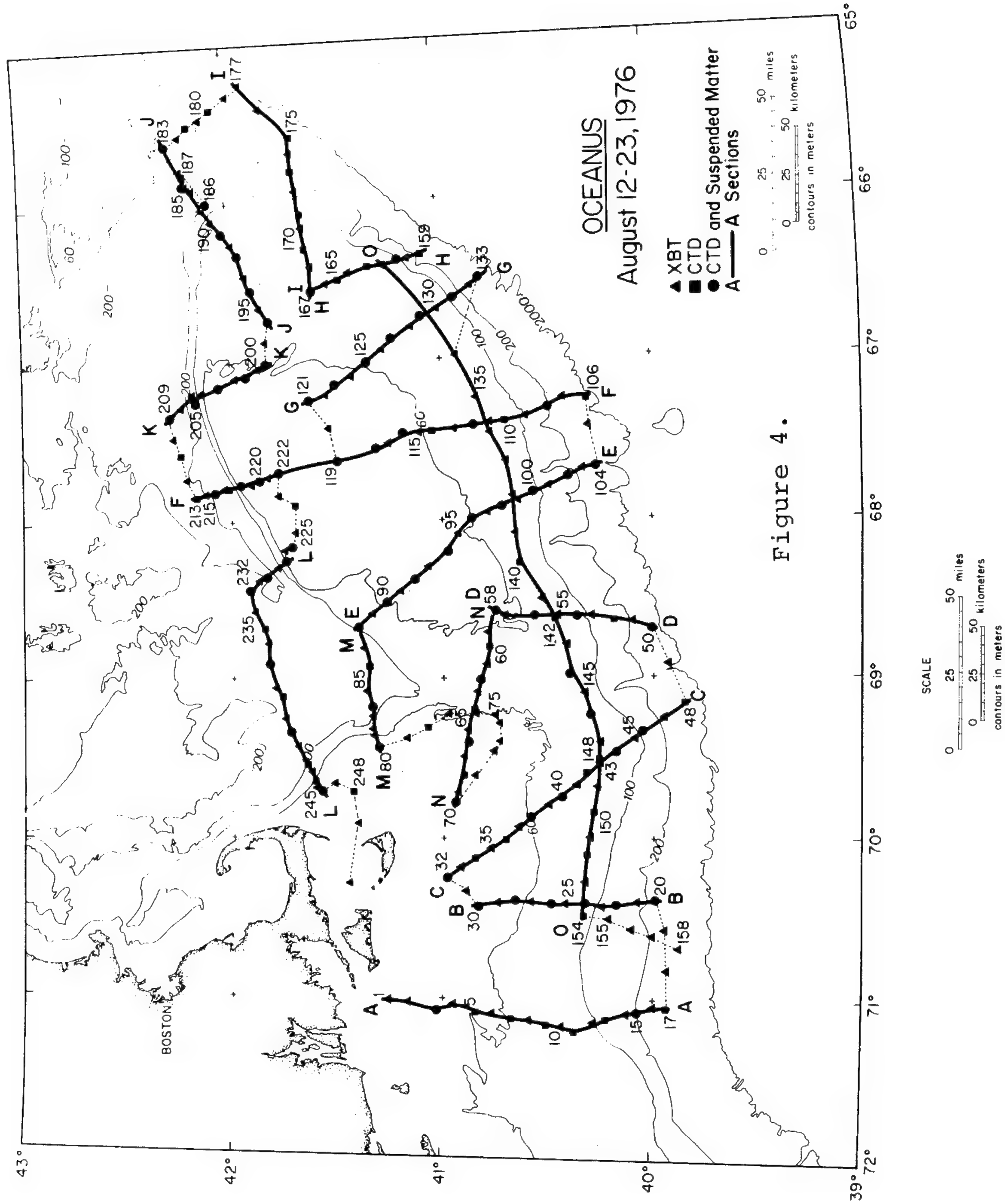

OCEANUS
August 12-23, 1976
XBT
CTD
CTD and Suspended Matter
A —— A Sections
miles
kilometers
contours in meters
BOSTON
SCALE

Figure 4.

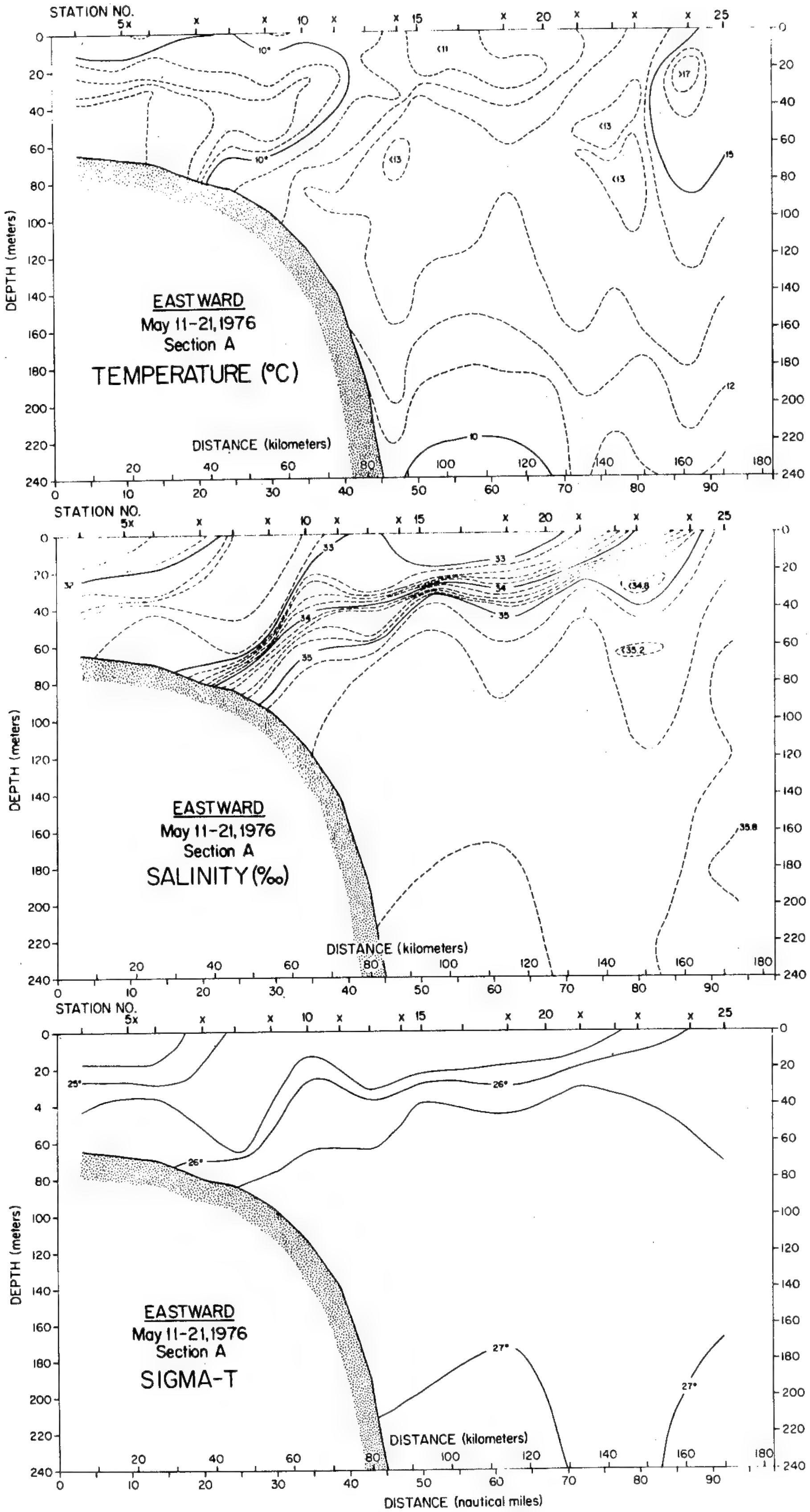

STATION NO.
EASTWARD
May 11-21, 1976
Section A
TEMPERATURE (°C)
SALINITY (‰)
SIGMA-T
DEPTH (meters)
DISTANCE (kilometers)
DISTANCE (nautical miles)

Figure 5.

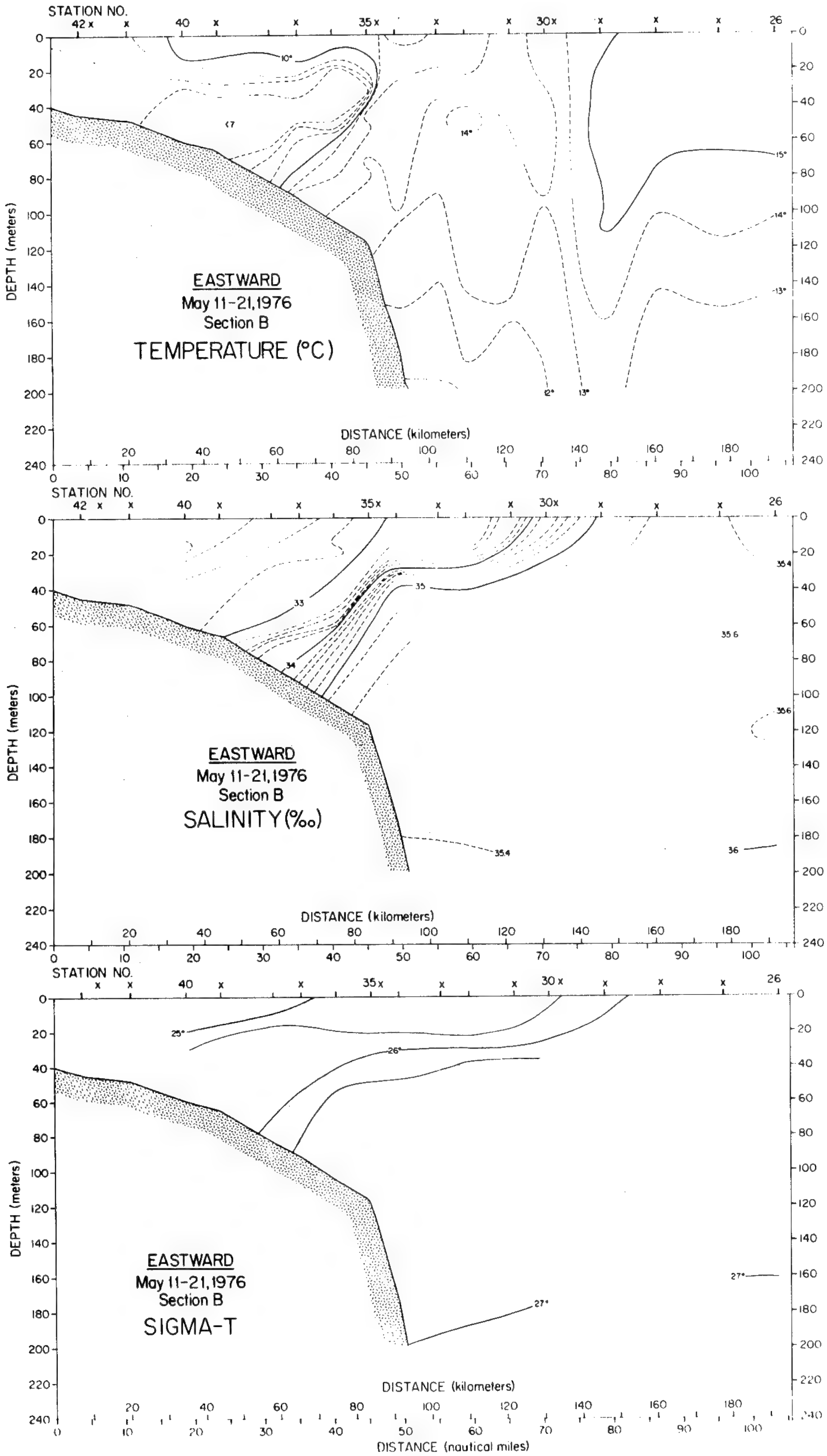
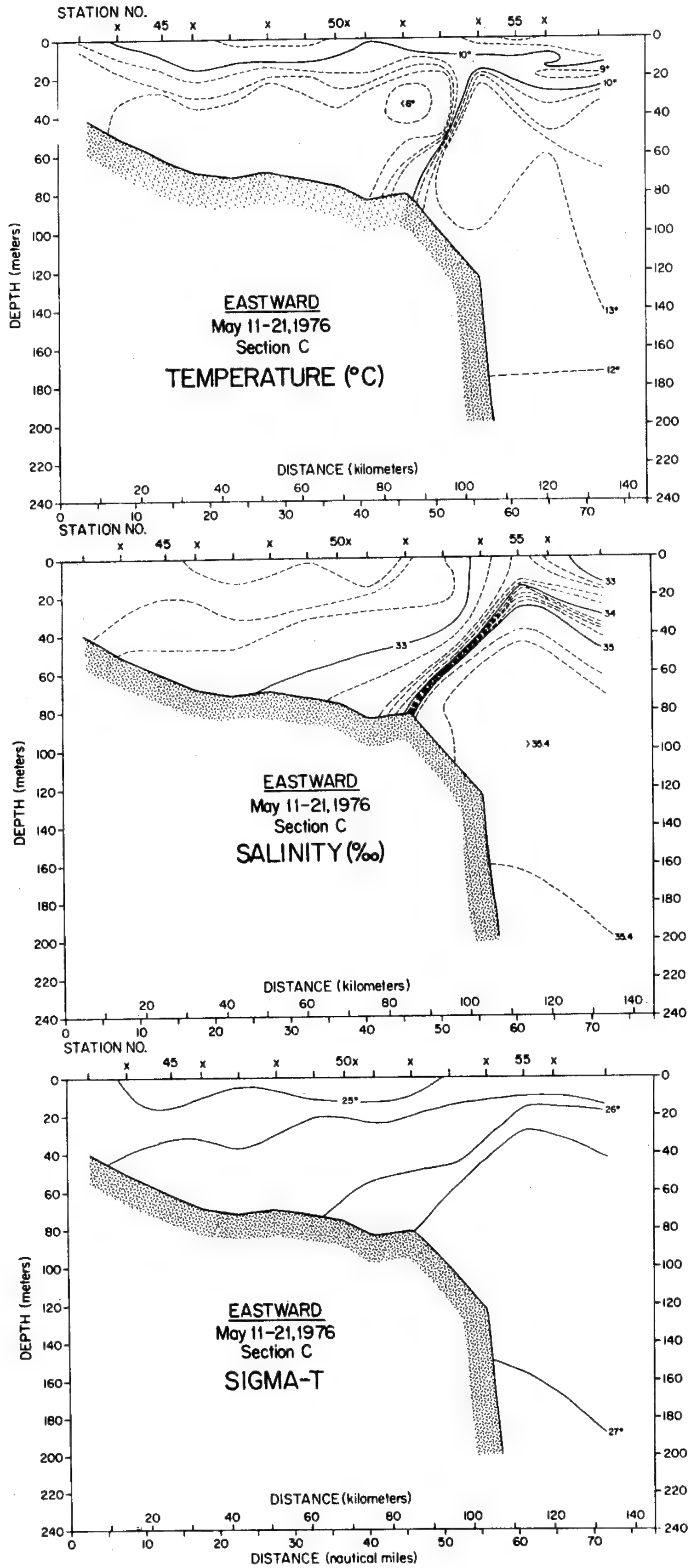

STATION NO.
EASTWARD
May 11-21, 1976
Section B
TEMPERATURE (°C)
DEPTH (meters)
DISTANCE (kilometers)
EASTWARD
May 11-21, 1976
Section B
SALINITY (‰)
EASTWARD
May 11-21, 1976
Section B
SIGMA-T
DISTANCE (nautical miles)

Figure 6.



STATION NO.
EASTWARD
May 11-21,1976
Section C
TEMPERATURE (°C)
SALINITY (‰)
SIGMA-T
DEPTH (meters)
DISTANCE (kilometers)
DISTANCE (nautical miles)

Figure 7.

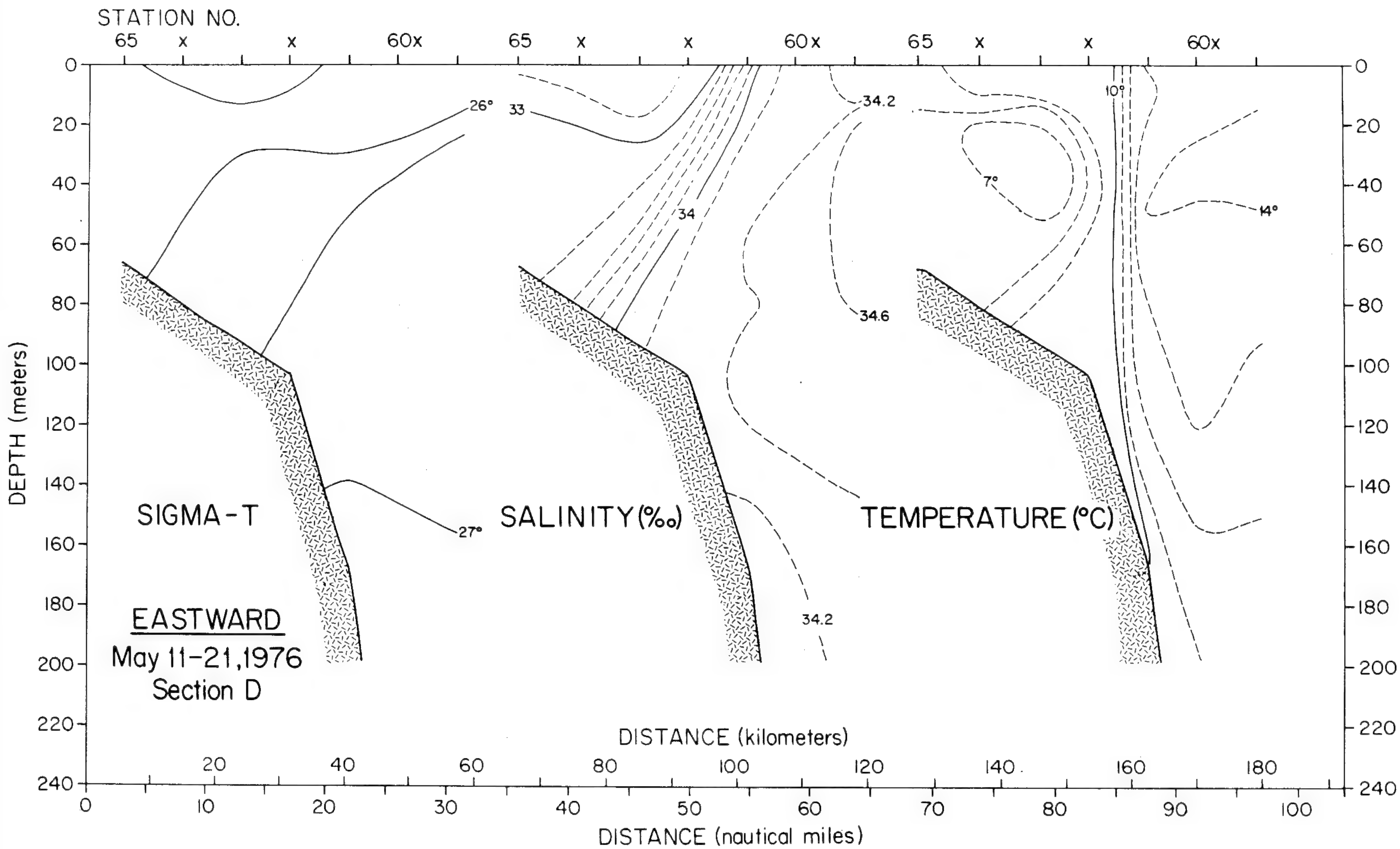
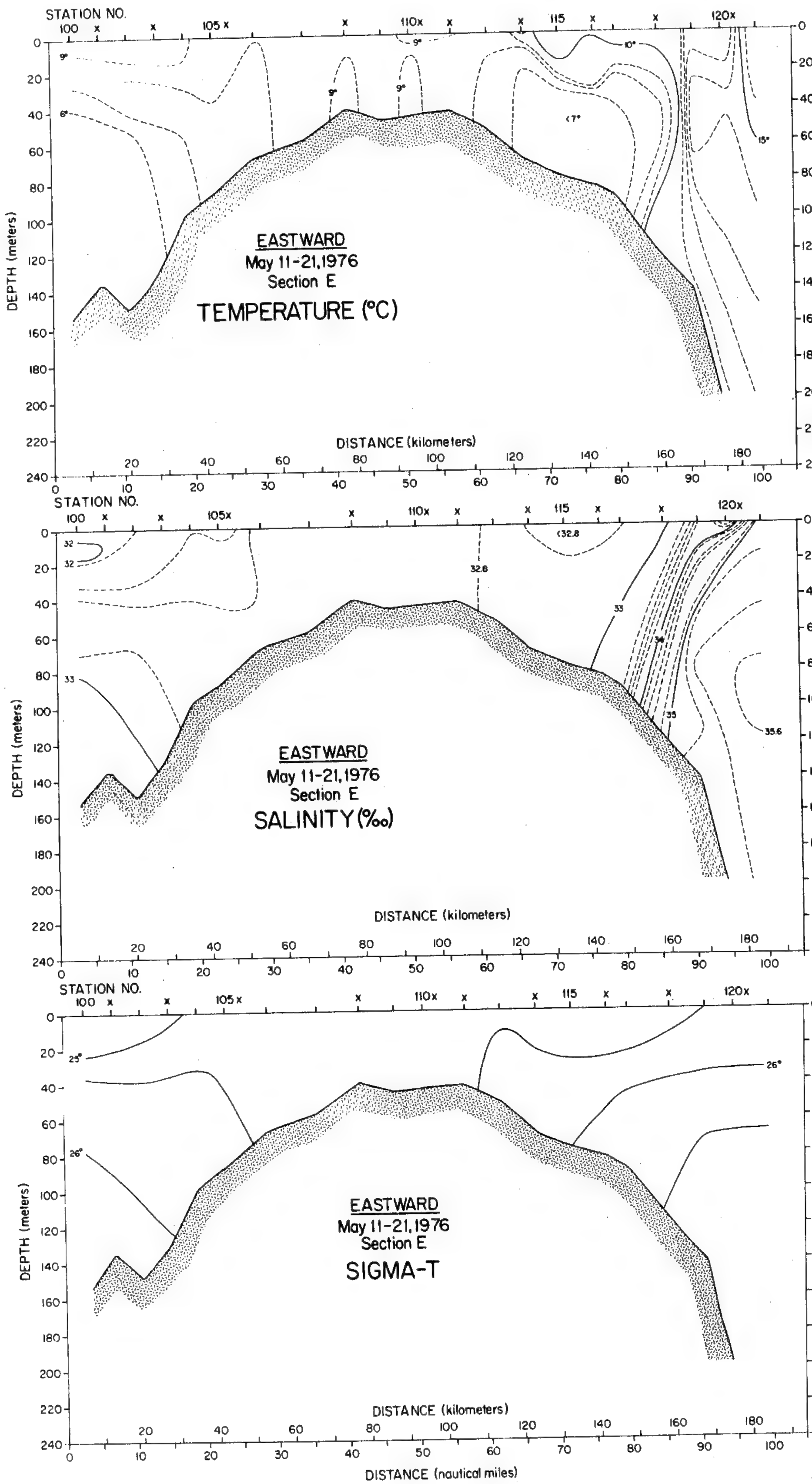
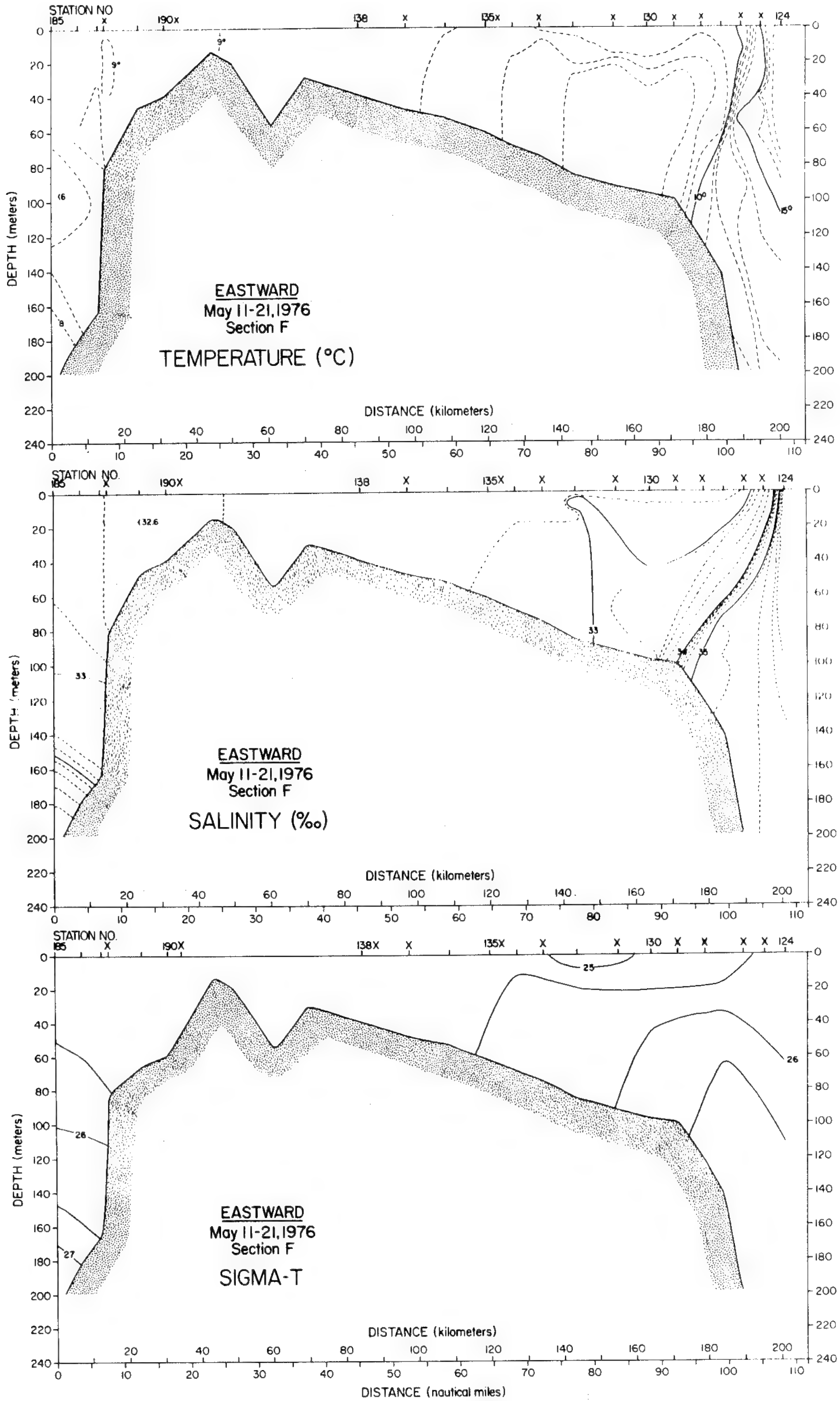

STATION NO.
65
x
x
60x
65
x
x
60x
65
x
x
60x
DEPTH (meters)
SIGMA-T
26°
27°
SALINITY (‰)
33
34
34.2
34.6
34.2
TEMPERATURE (°C)
10°
7°
14°
EASTWARD
May 11-21, 1976
Section D
DISTANCE (kilometers)
DISTANCE (nautical miles)

Figure 8.



STATION NO.
EASTWARD
May 11-21,1976
Section E
TEMPERATURE (°C)
SALINITY (‰)
SIGMA-T
DEPTH (meters)
DISTANCE (kilometers)
DISTANCE (nautical miles)

Figure 9.



STATION NO
DEPTH (meters)
EASTWARD
May 11-21, 1976
Section F
TEMPERATURE (°C)
DISTANCE (kilometers)
EASTWARD
May 11-21, 1976
Section F
SALINITY (‰)
DISTANCE (kilometers)
EASTWARD
May 11-21, 1976
Section F
SIGMA-T
DISTANCE (kilometers)
DISTANCE (nautical miles)

Figure 10.

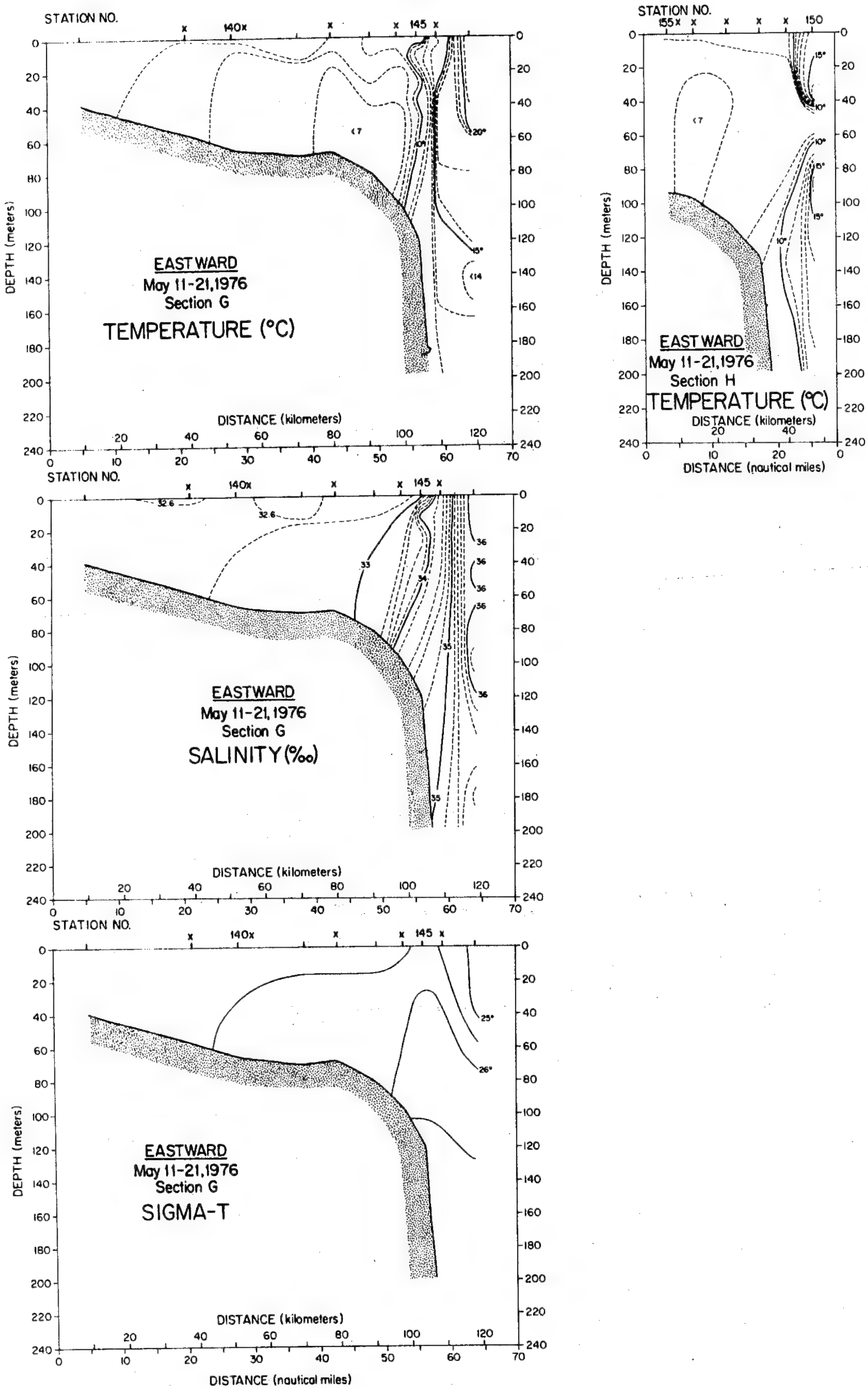

STATION NO.
EASTWARD
May 11-21,1976
Section G
TEMPERATURE (°C)
DEPTH (meters)
DISTANCE (kilometers)
EASTWARD
May 11-21,1976
Section H
TEMPERATURE (°C)
DISTANCE (kilometers)
DISTANCE (nautical miles)
EASTWARD
May 11-21,1976
Section G
SALINITY (‰)
EASTWARD
May 11-21,1976
Section G
SIGMA-T
DISTANCE (nautical miles)

Figure 11.

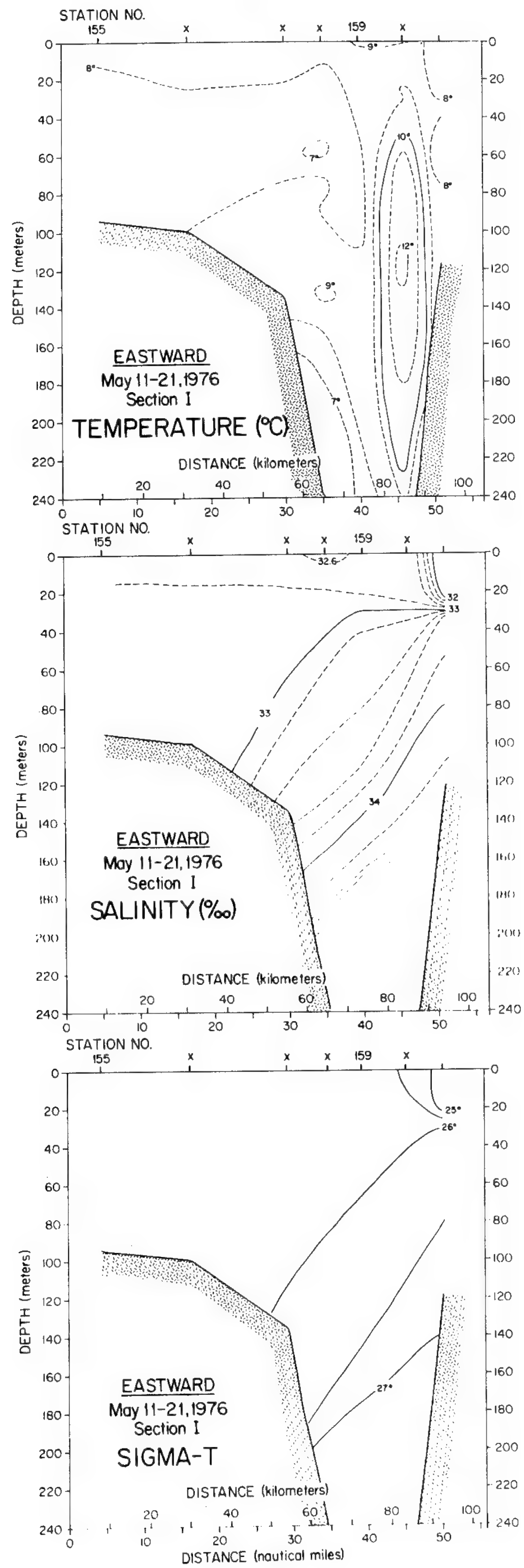

STATION NO.
EASTWARD
May 11-21, 1976
Section I
TEMPERATURE (°C)
SALINITY (‰)
SIGMA-T
DEPTH (meters)
DISTANCE (kilometers)
DISTANCE (nautical miles)

Figure 12.

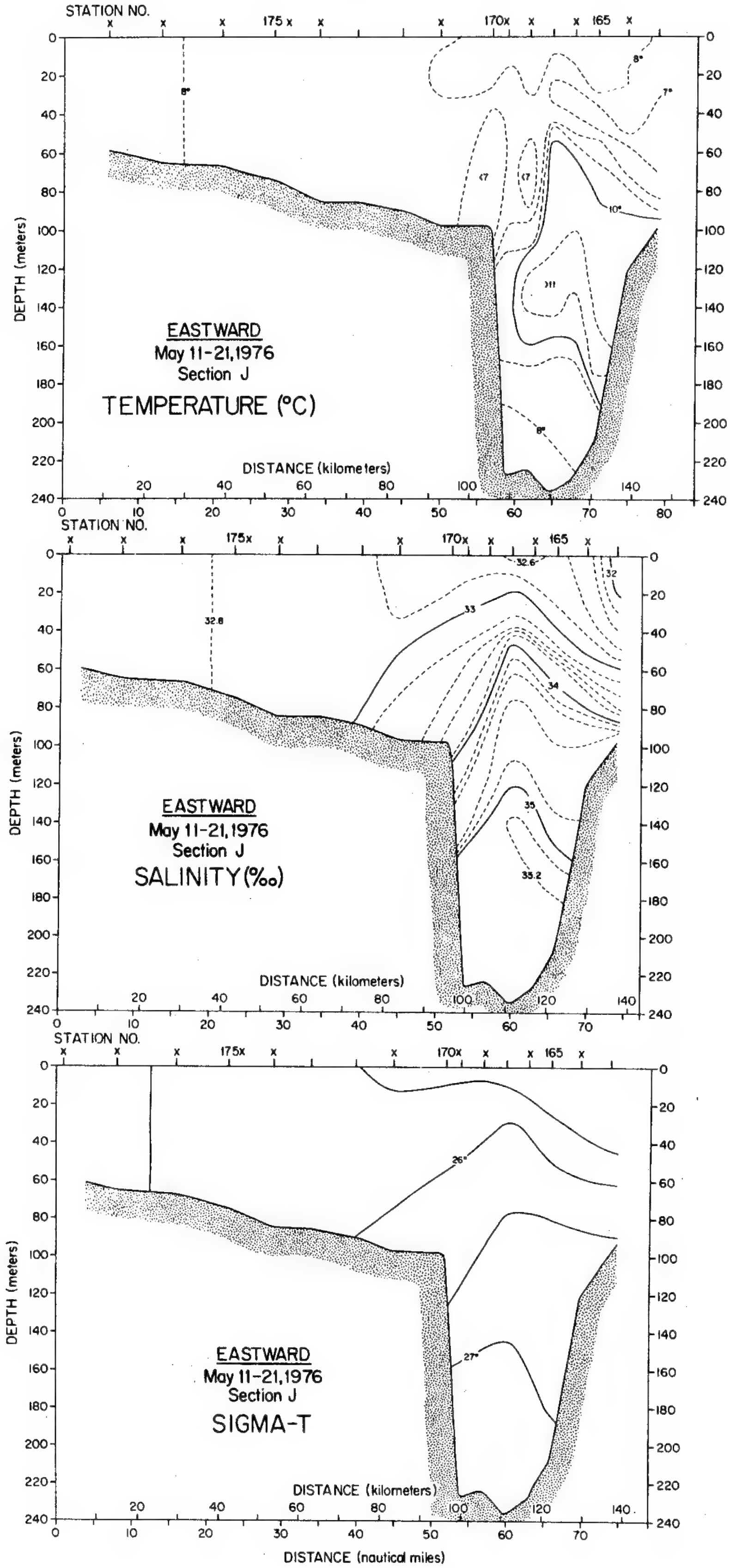

EASTWARD
May 11-21,1976
Section J
TEMPERATURE (°C)
SALINITY (‰)
SIGMA-T
STATION NO.
DEPTH (meters)
DISTANCE (kilometers)
DISTANCE (nautical miles)

Figure 13.

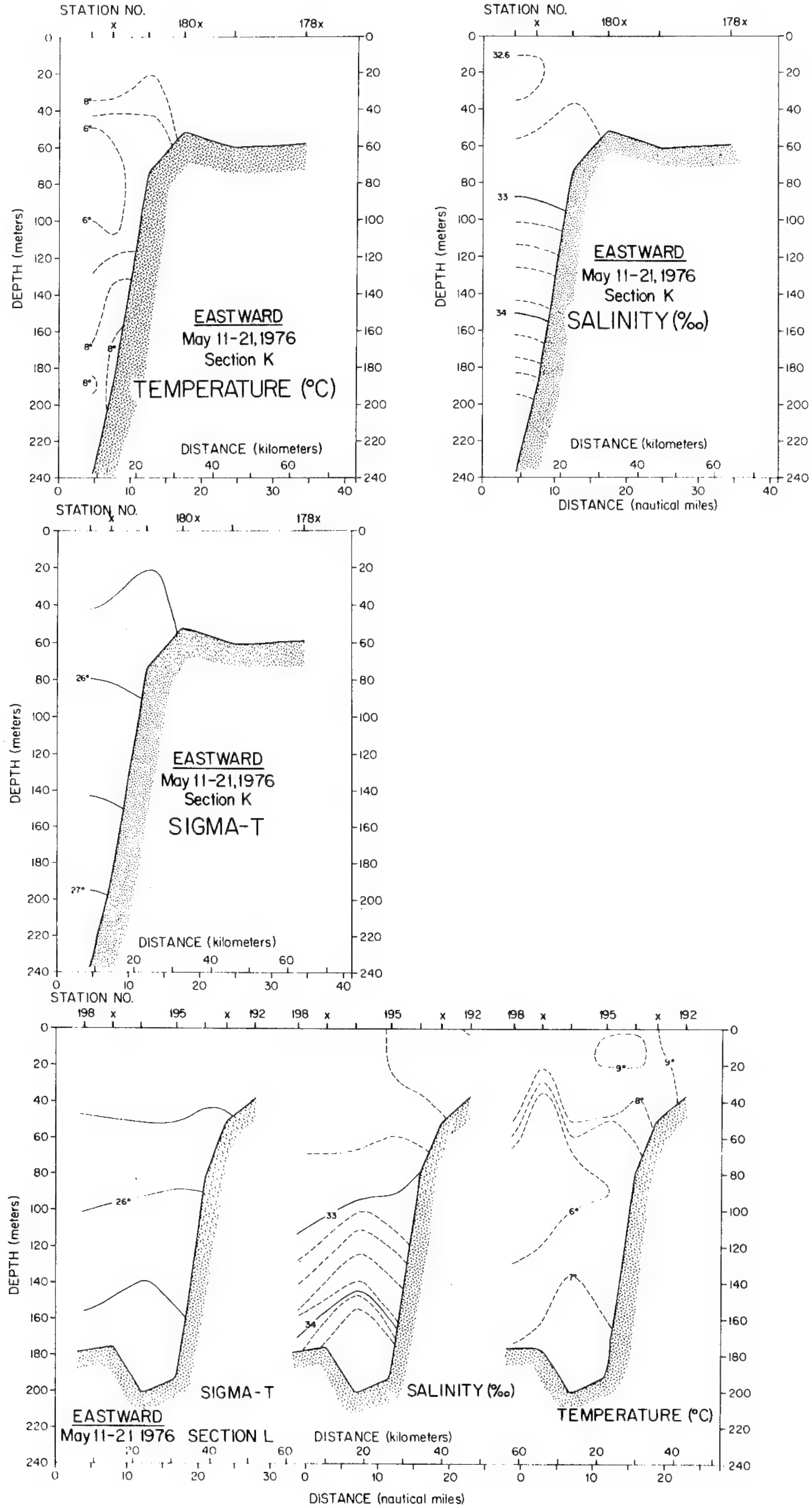
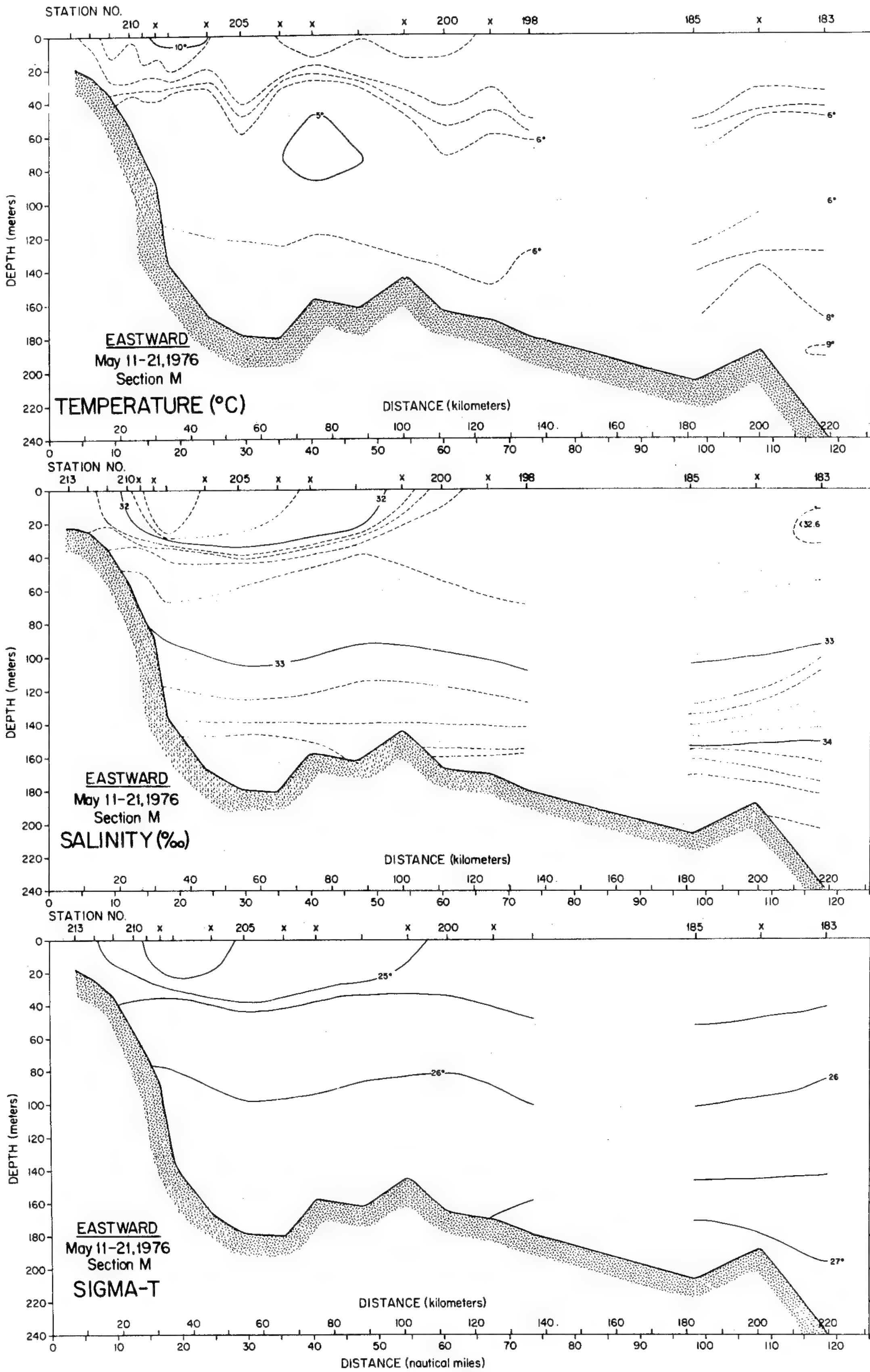

STATION NO.
180x
178x
DEPTH (meters)
EASTWARD
May 11-21, 1976
Section K
TEMPERATURE (°C)
DISTANCE (kilometers)
SALINITY (‰)
DISTANCE (nautical miles)
SIGMA-T
198
195
192
SECTION L
EASTWARD
May 11-21 1976 SECTION L
SIGMA-T
SALINITY (‰)
TEMPERATURE (°C)

Figure 14.



STATION NO.
EASTWARD
May 11-21, 1976
Section M
TEMPERATURE (°C)
SALINITY (‰)
SIGMA-T
DEPTH (meters)
DISTANCE (kilometers)
DISTANCE (nautical miles)

Figure 15.

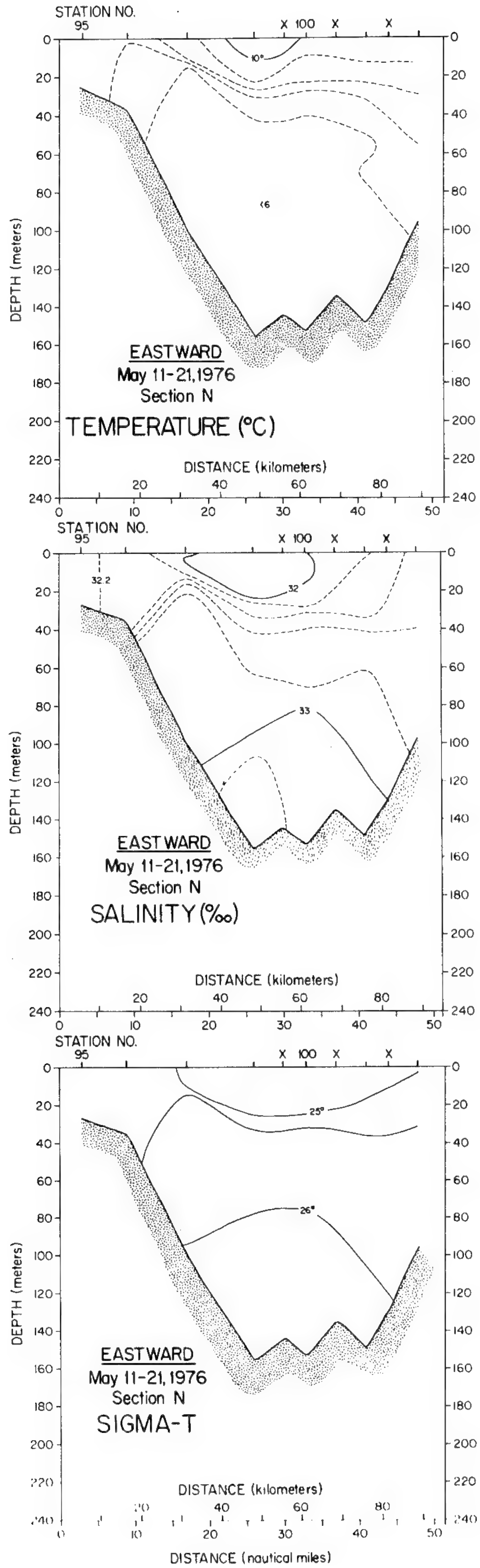
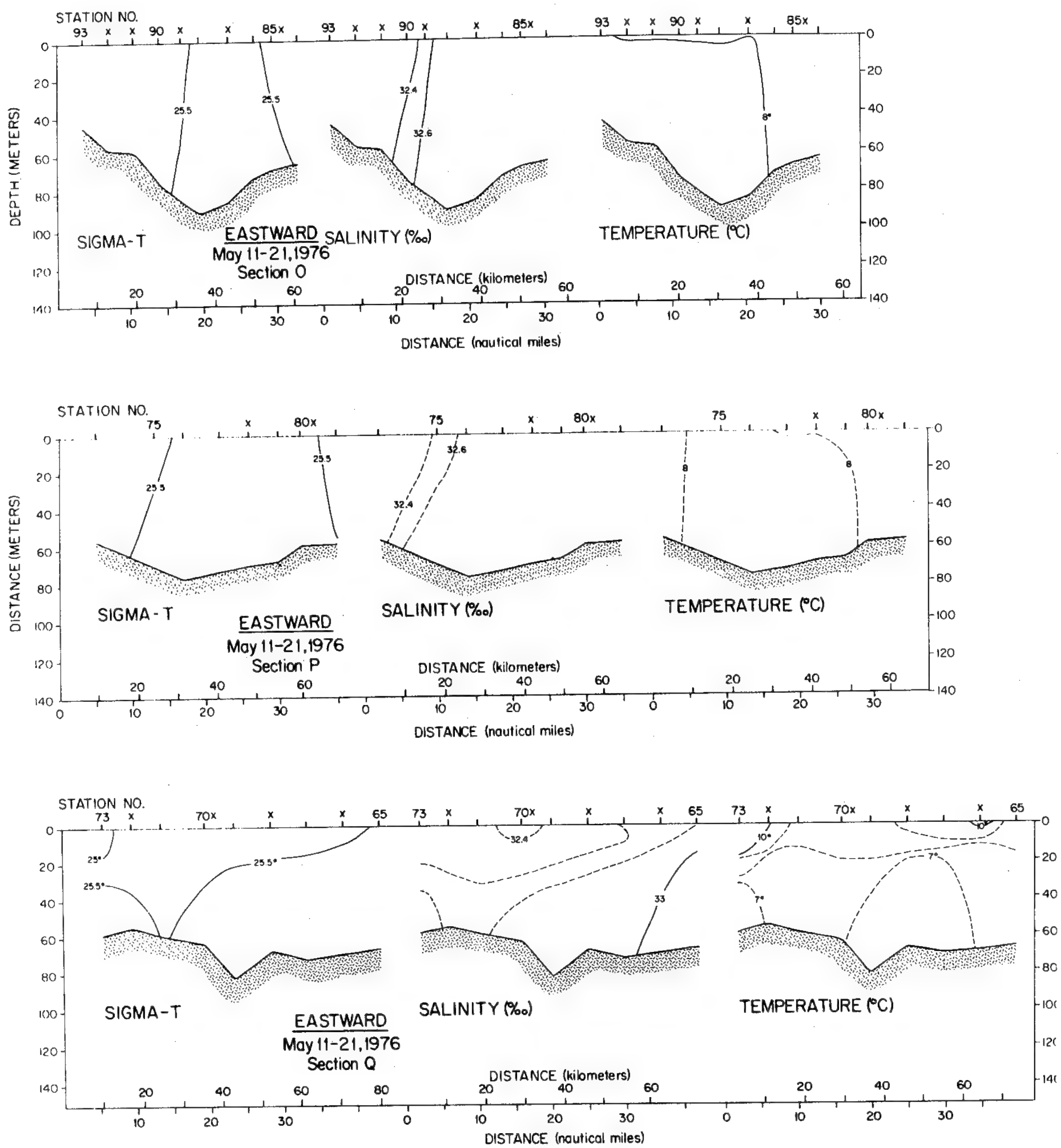

STATION NO.
95
100
EASTWARD
May 11-21, 1976
Section N
TEMPERATURE (°C)
DEPTH (meters)
DISTANCE (kilometers)
SALINITY (‰)
SIGMA-T
DISTANCE (nautical miles)

Figure 16.



STATION NO.
DEPTH (METERS)
SIGMA-T
EASTWARD
May 11-21,1976
Section O
SALINITY (‰)
TEMPERATURE (°C)
DISTANCE (kilometers)
DISTANCE (nautical miles)
DISTANCE (METERS)
SIGMA-T
EASTWARD
May 11-21,1976
Section P
SALINITY (‰)
TEMPERATURE (°C)
SIGMA-T
EASTWARD
May 11-21,1976
Section Q
SALINITY (‰)
TEMPERATURE (°C)

Figure 17.

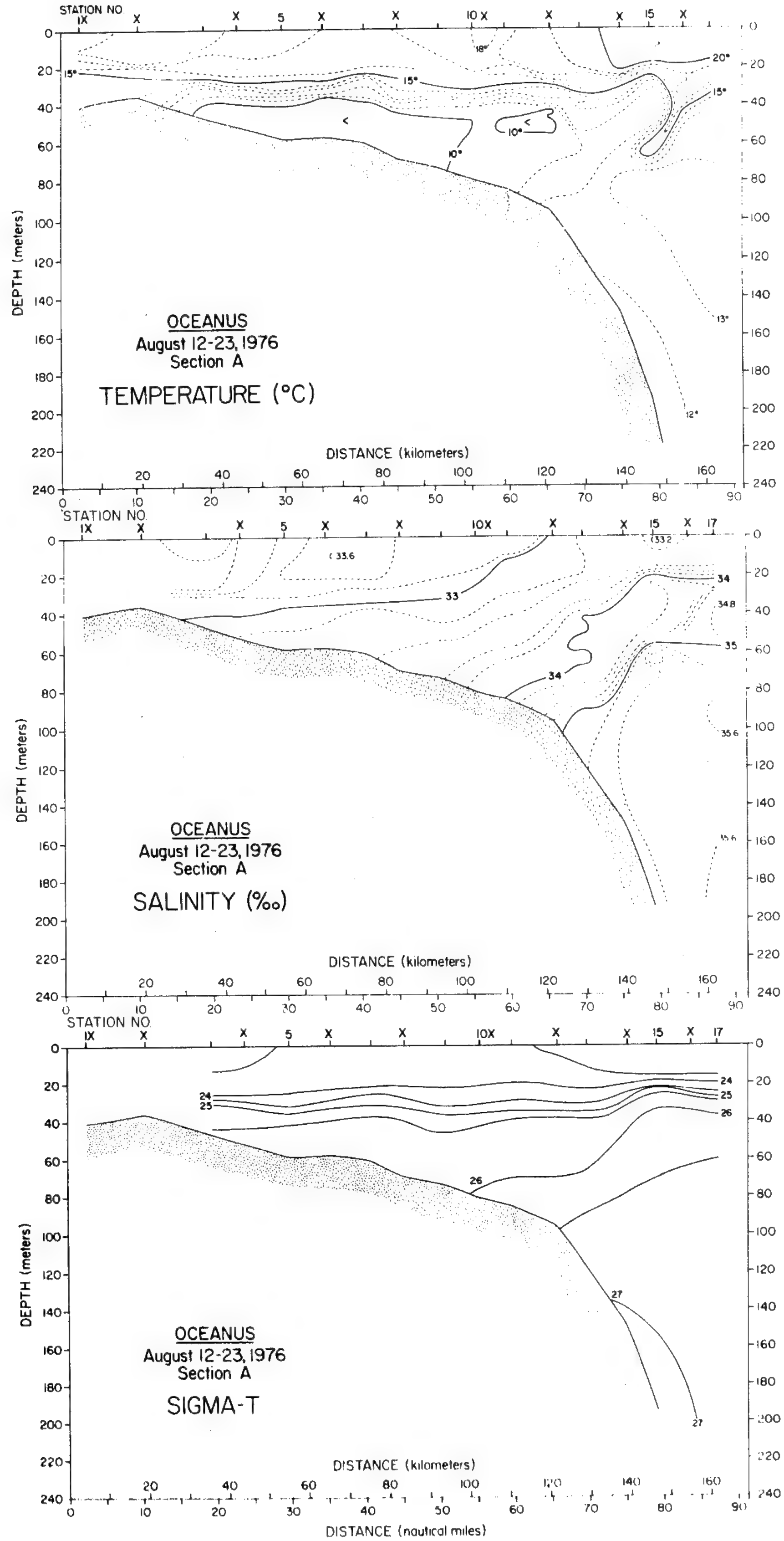

OCEANUS
August 12-23, 1976
Section A
TEMPERATURE (°C)
SALINITY (‰)
SIGMA-T
STATION NO.
DEPTH (meters)
DISTANCE (kilometers)
DISTANCE (nautical miles)

Figure 18.

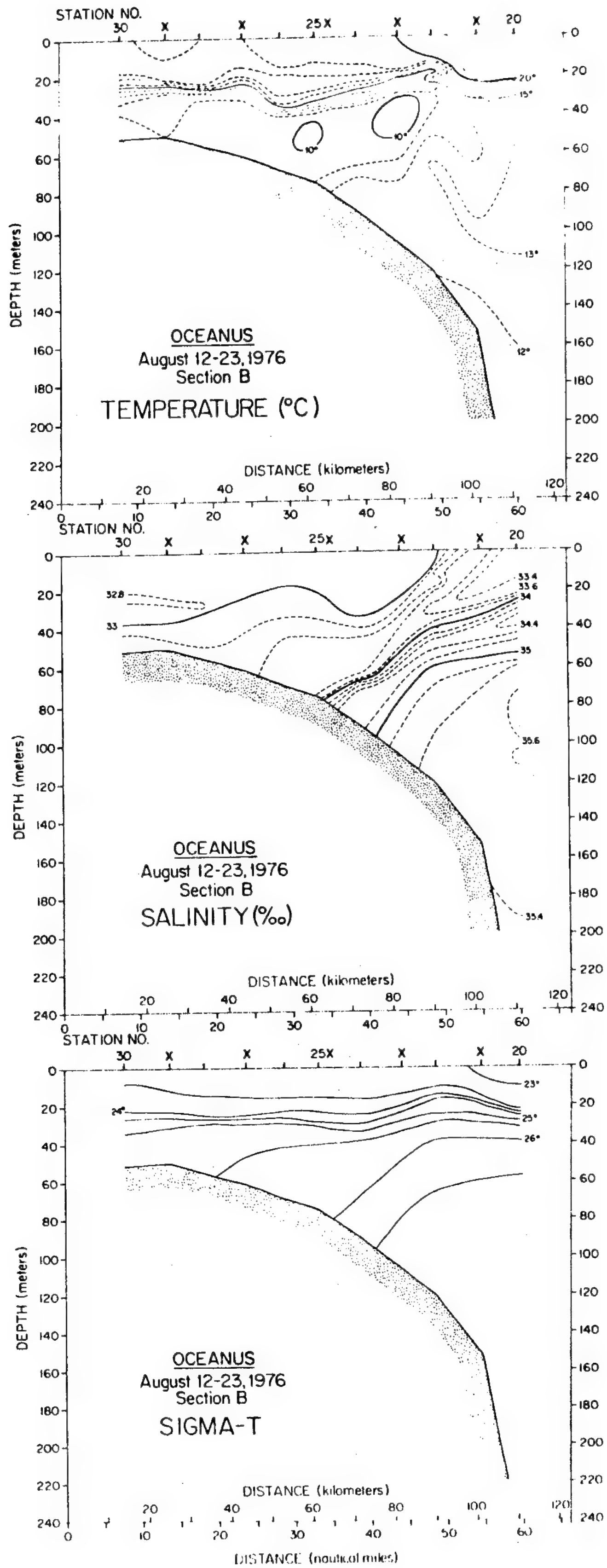

STATION NO.
DEPTH (meters)
OCEANUS
August 12-23, 1976
Section B
TEMPERATURE (°C)
DISTANCE (kilometers)
STATION NO.
DEPTH (meters)
OCEANUS
August 12-23, 1976
Section B
SALINITY (‰)
DISTANCE (kilometers)
STATION NO.
DEPTH (meters)
OCEANUS
August 12-23, 1976
Section B
SIGMA-T
DISTANCE (kilometers)
DISTANCE (nautical miles)

Figure 19.

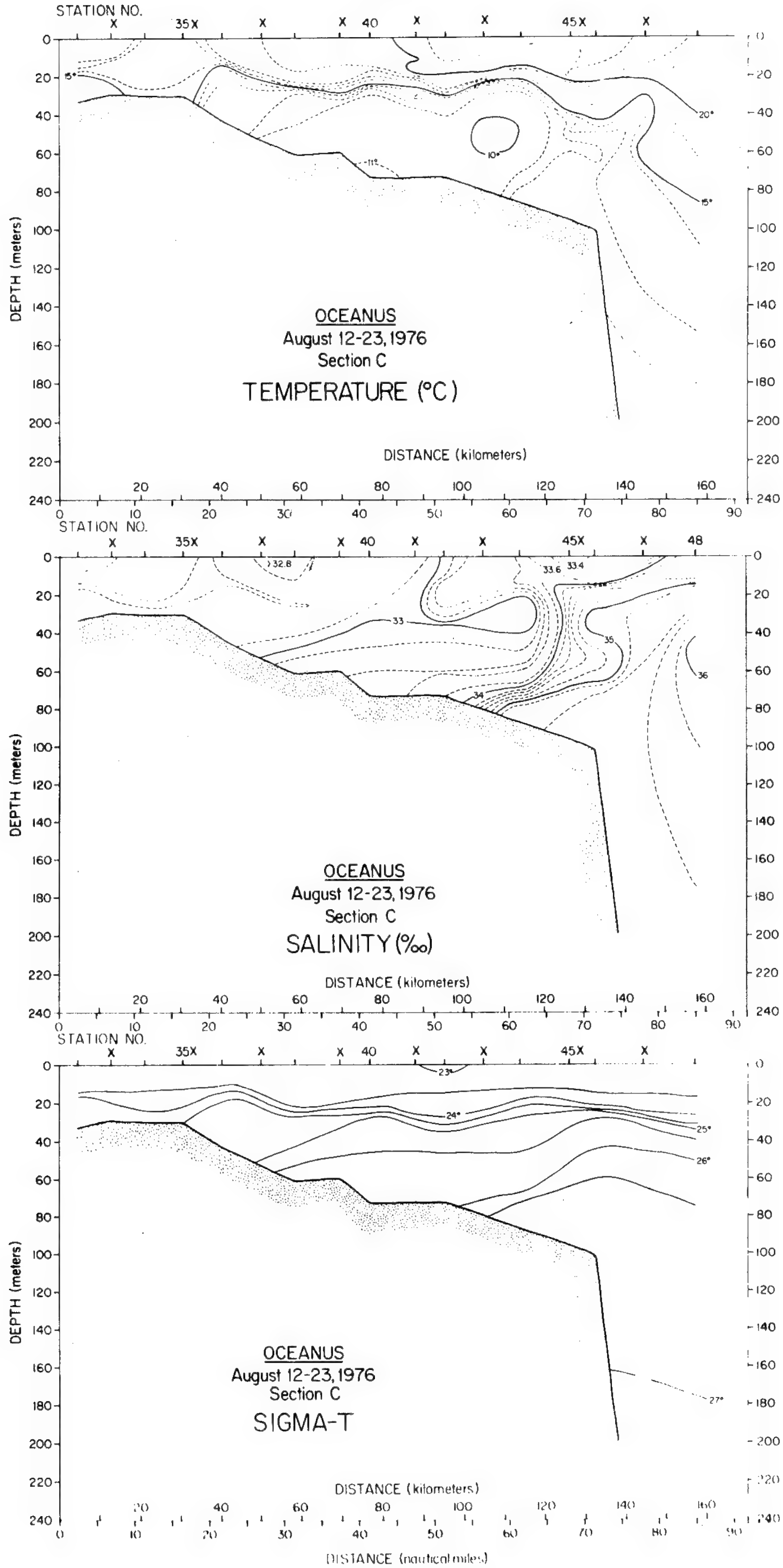

STATION NO.
DEPTH (meters)
OCEANUS
August 12-23, 1976
Section C
TEMPERATURE (°C)
DISTANCE (kilometers)
OCEANUS
August 12-23, 1976
Section C
SALINITY (‰)
DISTANCE (kilometers)
OCEANUS
August 12-23, 1976
Section C
SIGMA-T
DISTANCE (kilometers)
DISTANCE (nautical miles)

Figure 20.

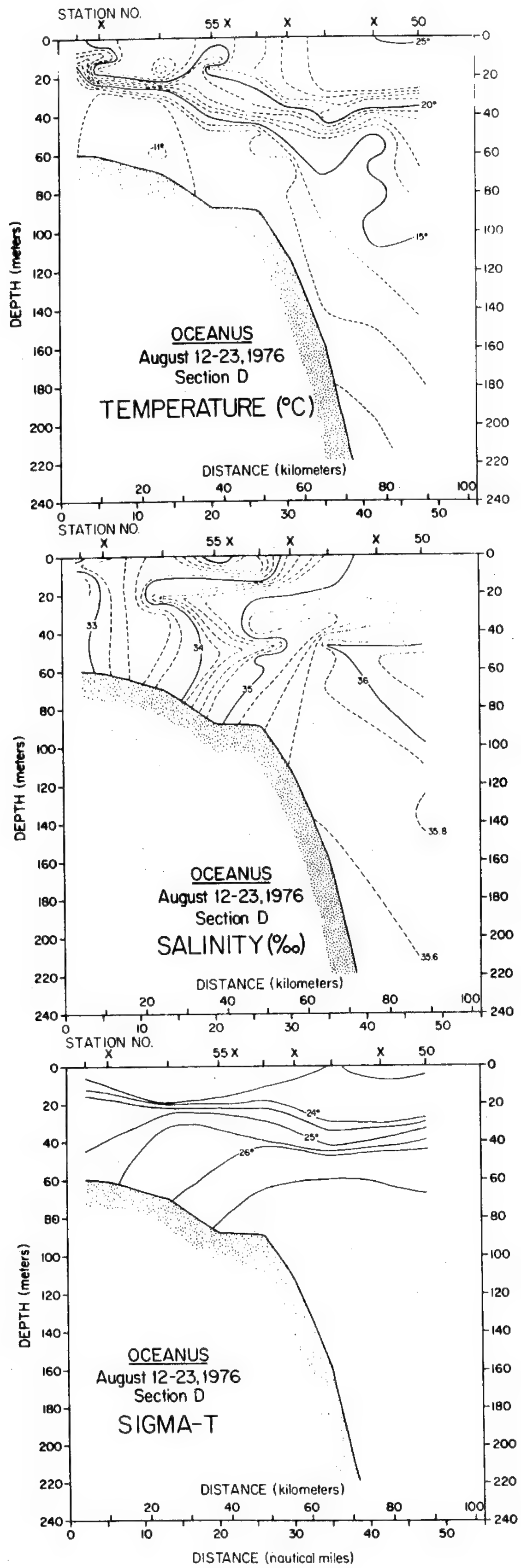

STATION NO.
OCEANUS
August 12-23, 1976
Section D
TEMPERATURE (°C)
DEPTH (meters)
DISTANCE (kilometers)
OCEANUS
August 12-23, 1976
Section D
SALINITY (‰)
OCEANUS
August 12-23, 1976
Section D
SIGMA-T
DISTANCE (nautical miles)

Figure 21.

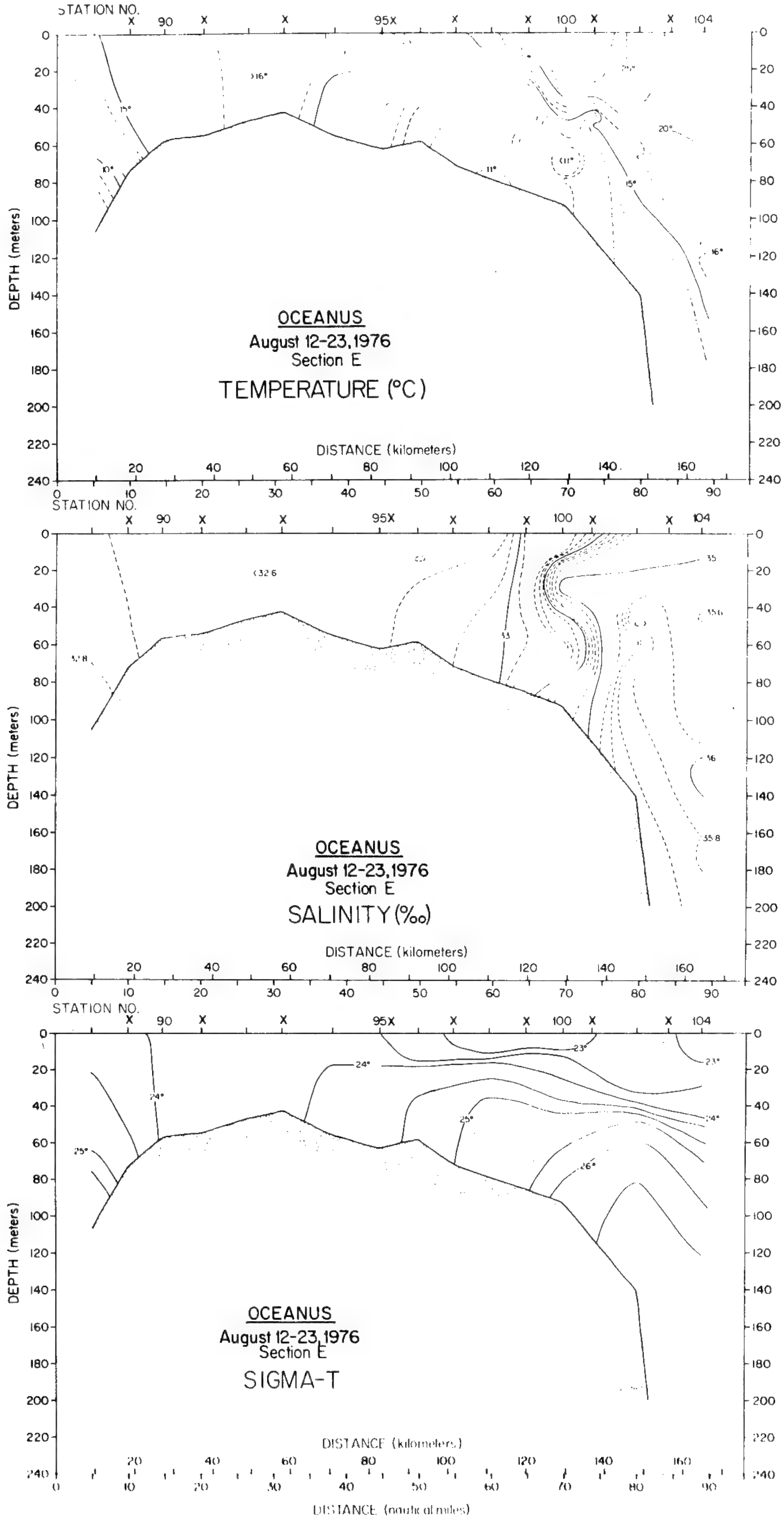
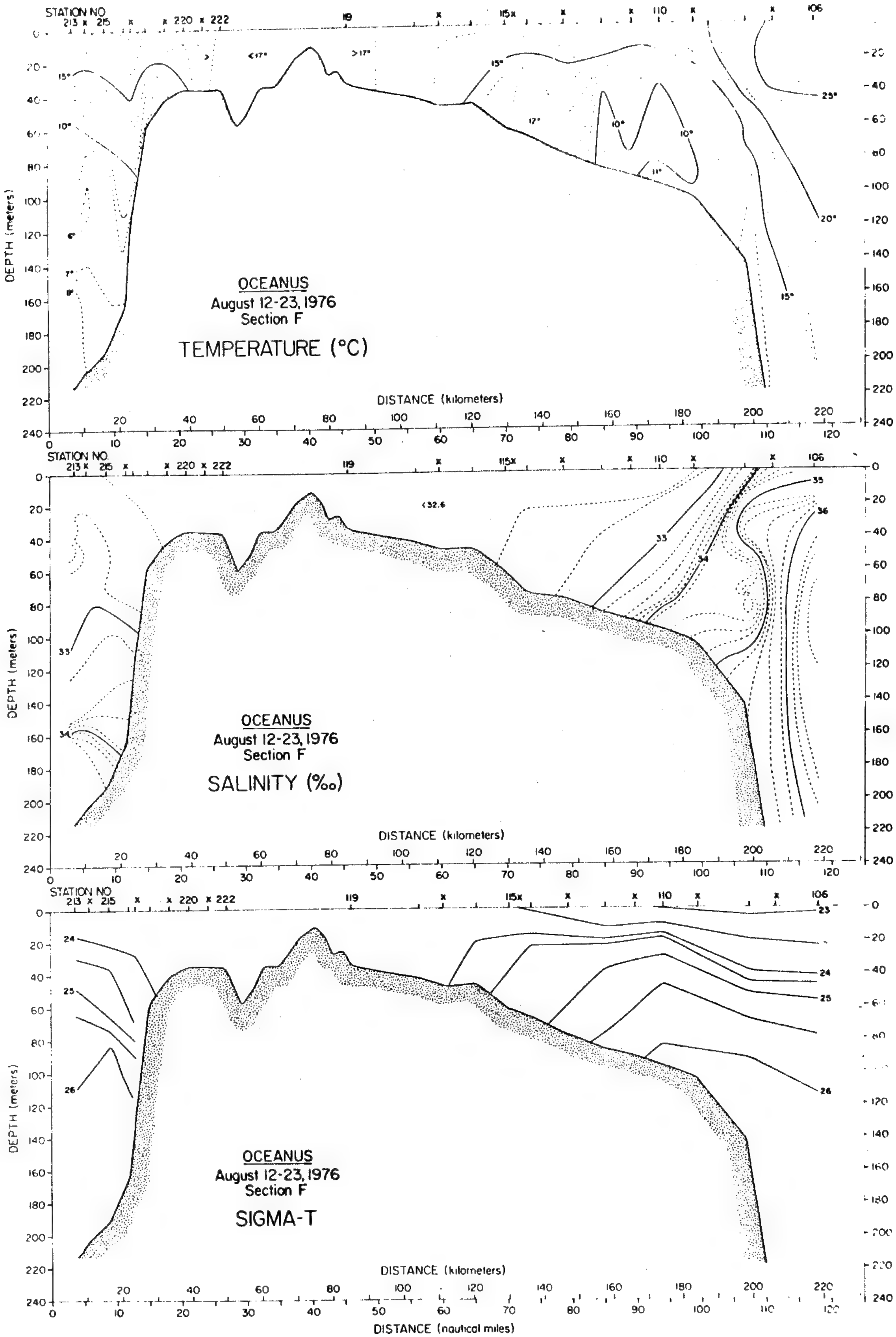
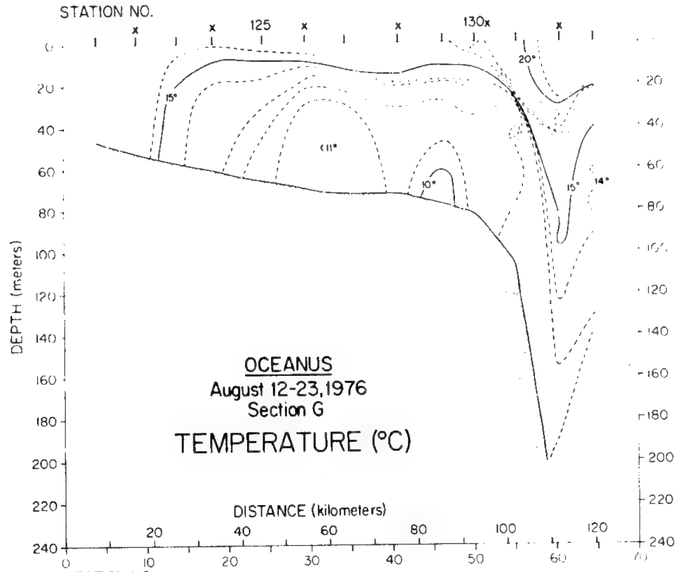

STATION NO.
X 90 X X 95X X X 100 X X 104
DEPTH (meters)
OCEANUS
August 12-23, 1976
Section E
TEMPERATURE (°C)
DISTANCE (kilometers)
20 40 60 80 100 120 140 160
0 10 20 30 40 50 60 70 80 90
OCEANUS
August 12-23, 1976
Section E
SALINITY (‰)
OCEANUS
August 12-23, 1976
Section E
SIGMA-T
DISTANCE (nautical miles)

Figure 22.

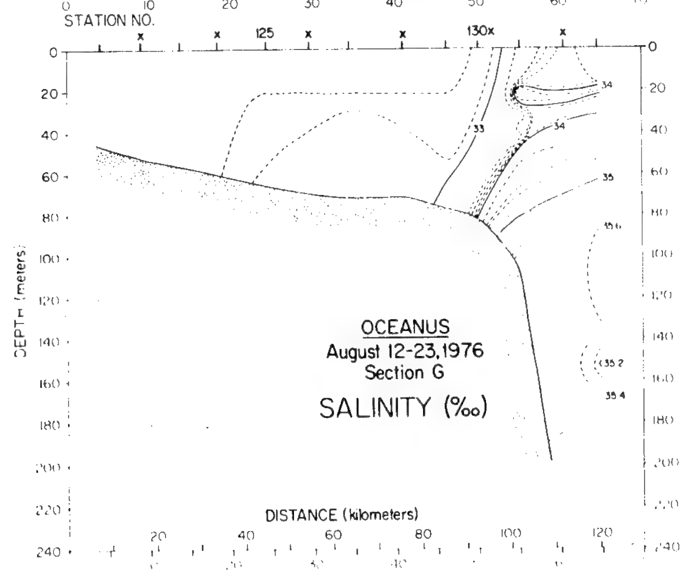


STATION NO
OCEANUS
August 12-23, 1976
Section F
TEMPERATURE (°C)
DEPTH (meters)
DISTANCE (kilometers)
OCEANUS
August 12-23, 1976
Section F
SALINITY (‰)
OCEANUS
August 12-23, 1976
Section F
SIGMA-T
DISTANCE (nautical miles)

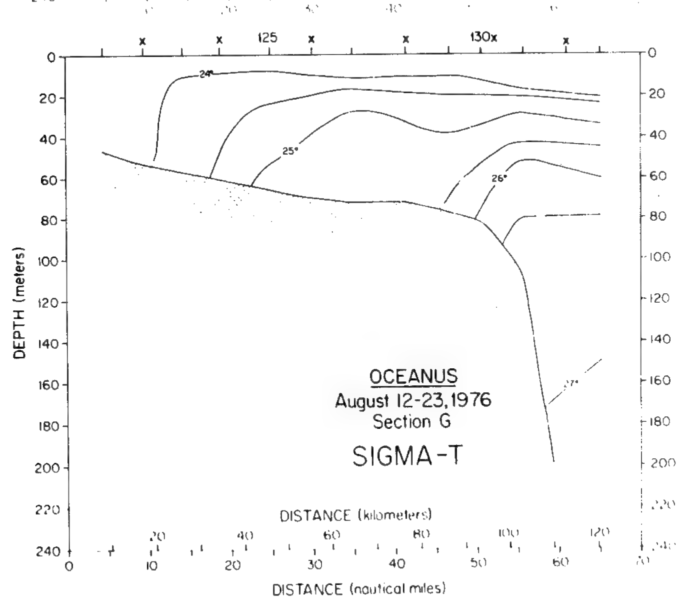
Figure 23.



STATION NO.
125
130x
DEPTH (meters)
OCEANUS
August 12-23,1976
Section G
TEMPERATURE (°C)
DISTANCE (kilometers)



STATION NO.
125
130x
DEPTH (meters)
OCEANUS
August 12-23,1976
Section G
SALINITY (‰)
DISTANCE (kilometers)



125
130x
DEPTH (meters)
OCEANUS
August 12-23,1976
Section G
SIGMA-T
DISTANCE (kilometers)
DISTANCE (nautical miles)

Figure 24.

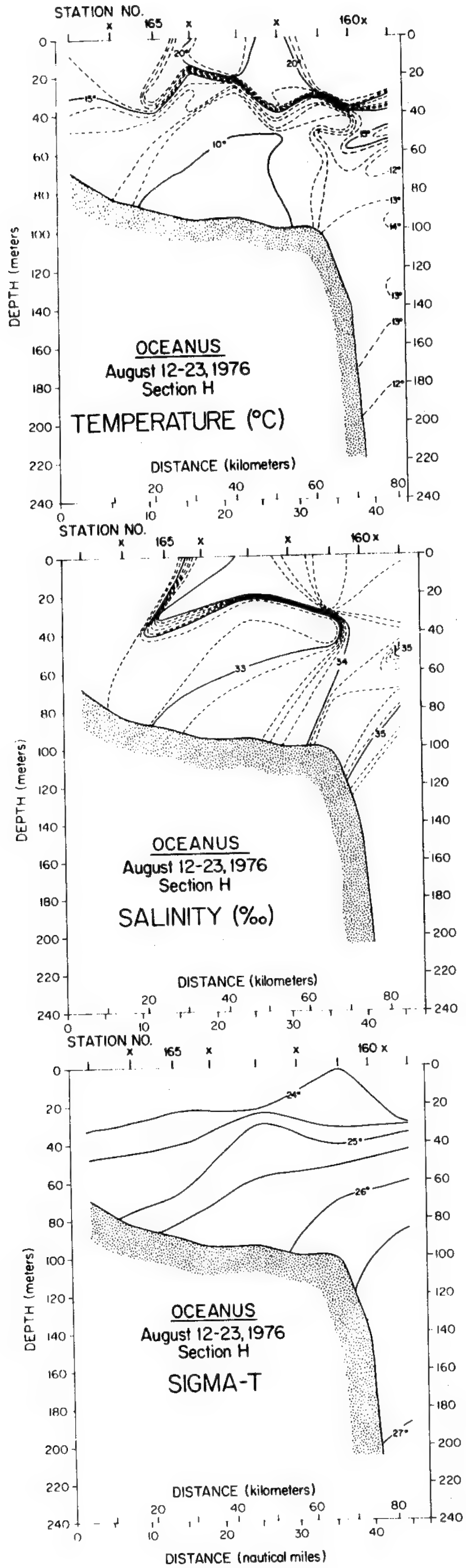

STATION NO.
OCEANUS
August 12-23, 1976
Section H
TEMPERATURE (°C)
DEPTH (meters)
DISTANCE (kilometers)
OCEANUS
August 12-23, 1976
Section H
SALINITY (‰)
OCEANUS
August 12-23, 1976
Section H
SIGMA-T
DISTANCE (nautical miles)

Figure 25.

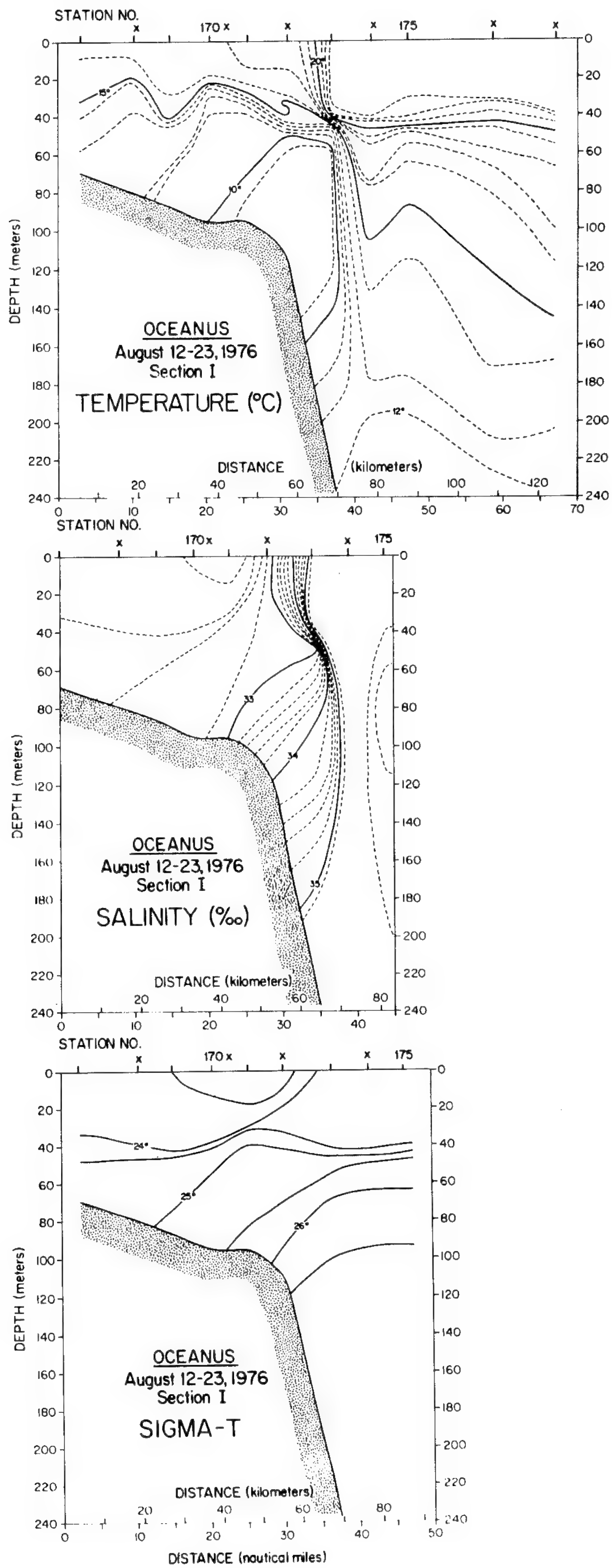
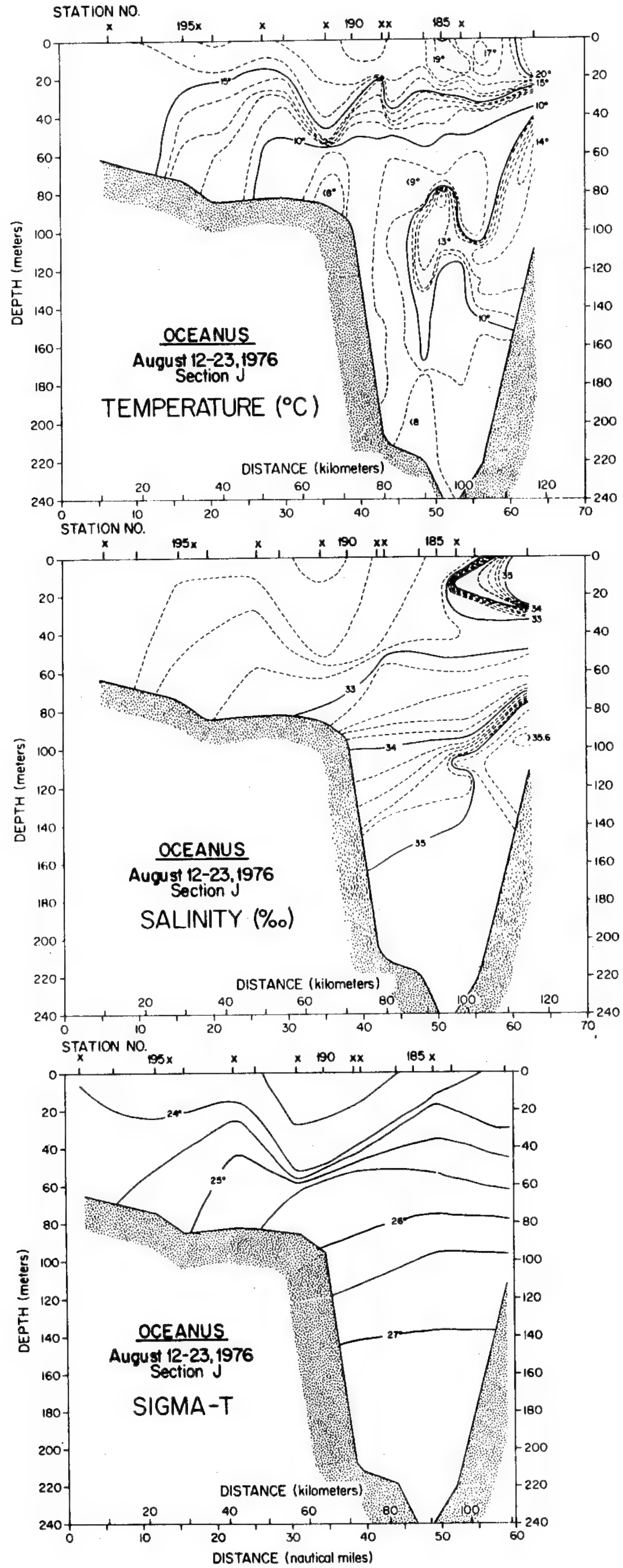

STATION NO.
DEPTH (meters)
OCEANUS
August 12-23, 1976
Section I
TEMPERATURE (°C)
DISTANCE (kilometers)
SALINITY (‰)
SIGMA-T
DISTANCE (nautical miles)

Figure 26.



STATION NO.
195x
190
185
OCEANUS
August 12-23, 1976
Section J
TEMPERATURE (°C)
DEPTH (meters)
DISTANCE (kilometers)
OCEANUS
August 12-23, 1976
Section J
SALINITY (‰)
DEPTH (meters)
DISTANCE (kilometers)
OCEANUS
August 12-23, 1976
Section J
SIGMA-T
DEPTH (meters)
DISTANCE (kilometers)
DISTANCE (nautical miles)

Figure 27.

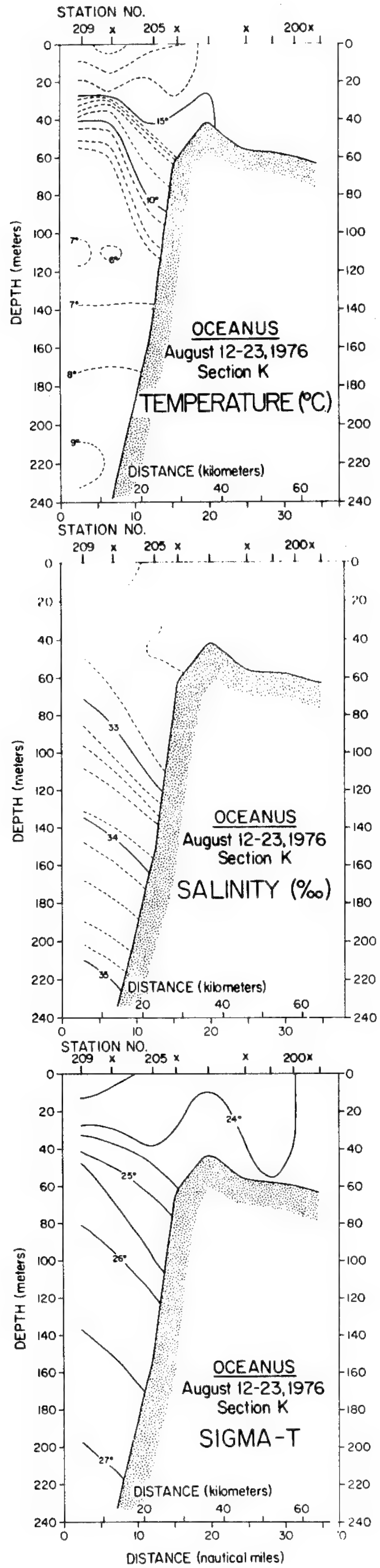

STATION NO.
209 x 205 x x 200x
DEPTH (meters)
OCEANUS
August 12-23, 1976
Section K
TEMPERATURE (°C)
15°
10°
7°
6°
8°
9°
DISTANCE (kilometers)
20 40 60
STATION NO.
209 x 205 x x 200x
OCEANUS
August 12-23, 1976
Section K
SALINITY (‰)
33
34
35
STATION NO.
209 x 205 x x 200x
OCEANUS
August 12-23, 1976
Section K
SIGMA-T
24°
25°
26°
27°
DISTANCE (nautical miles)

Figure 28.

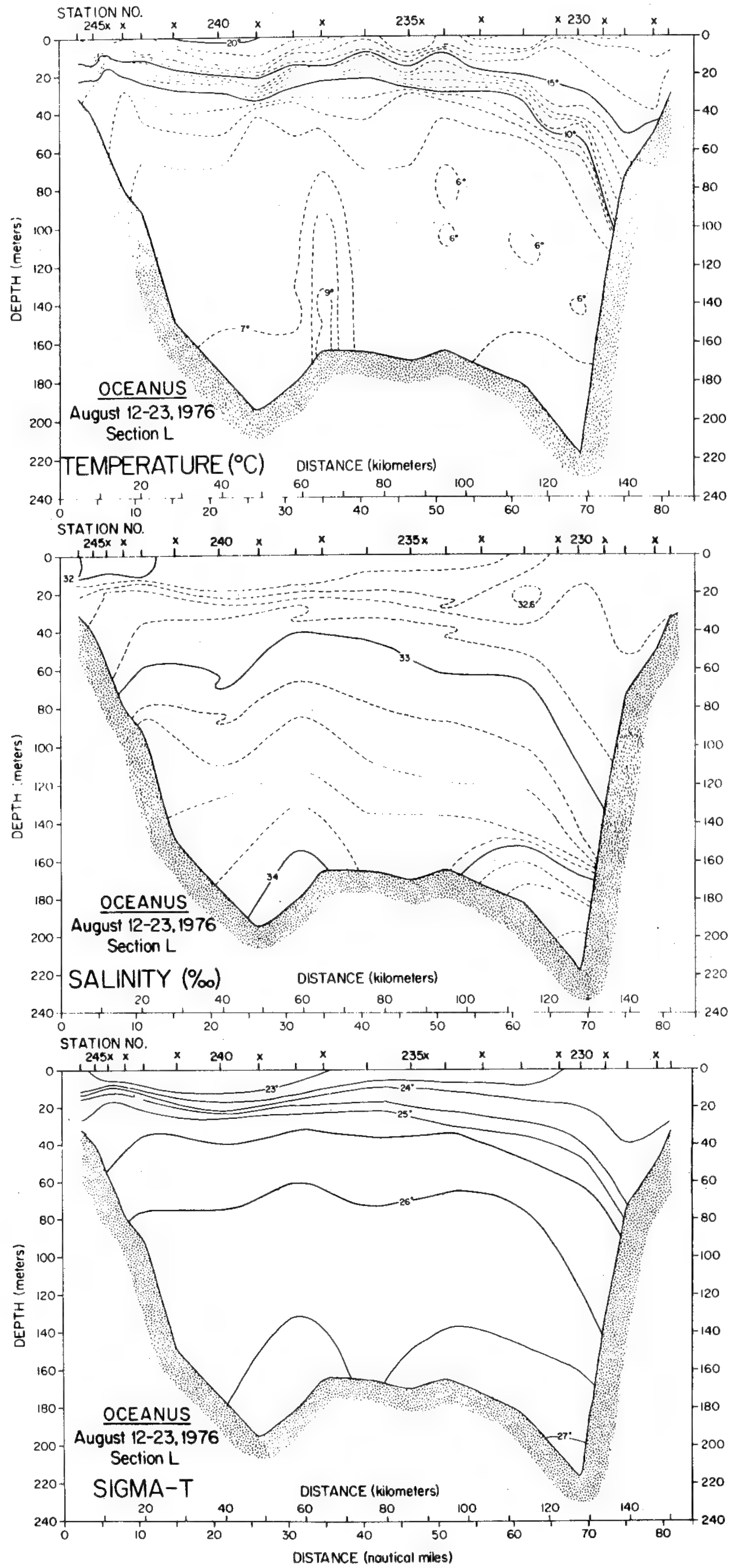

STATION NO.
245x
240
235x
230
DEPTH (meters)
OCEANUS
August 12-23, 1976
Section L
TEMPERATURE (°C)
DISTANCE (kilometers)
SALINITY (‰)
SIGMA-T
DISTANCE (nautical miles)

Figure 29.

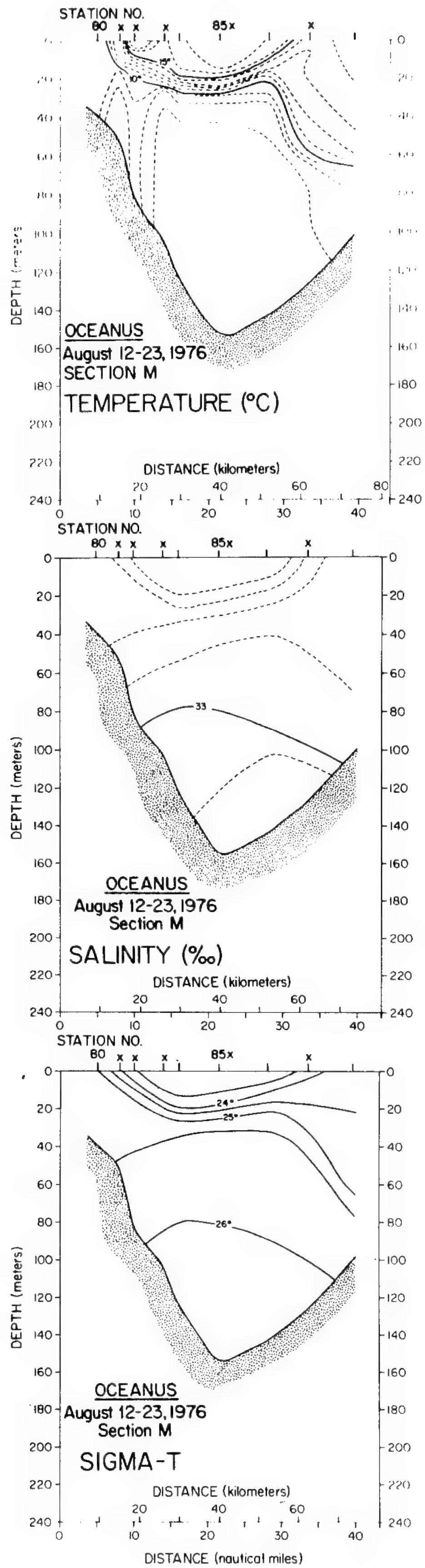

STATION NO.
80 x x x 85x x
OCEANUS
August 12-23, 1976
SECTION M
TEMPERATURE (°C)
DISTANCE (kilometers)
DEPTH (meters)
OCEANUS
August 12-23, 1976
Section M
SALINITY (‰)
OCEANUS
August 12-23, 1976
Section M
SIGMA-T
DISTANCE (nautical miles)

Figure 30.

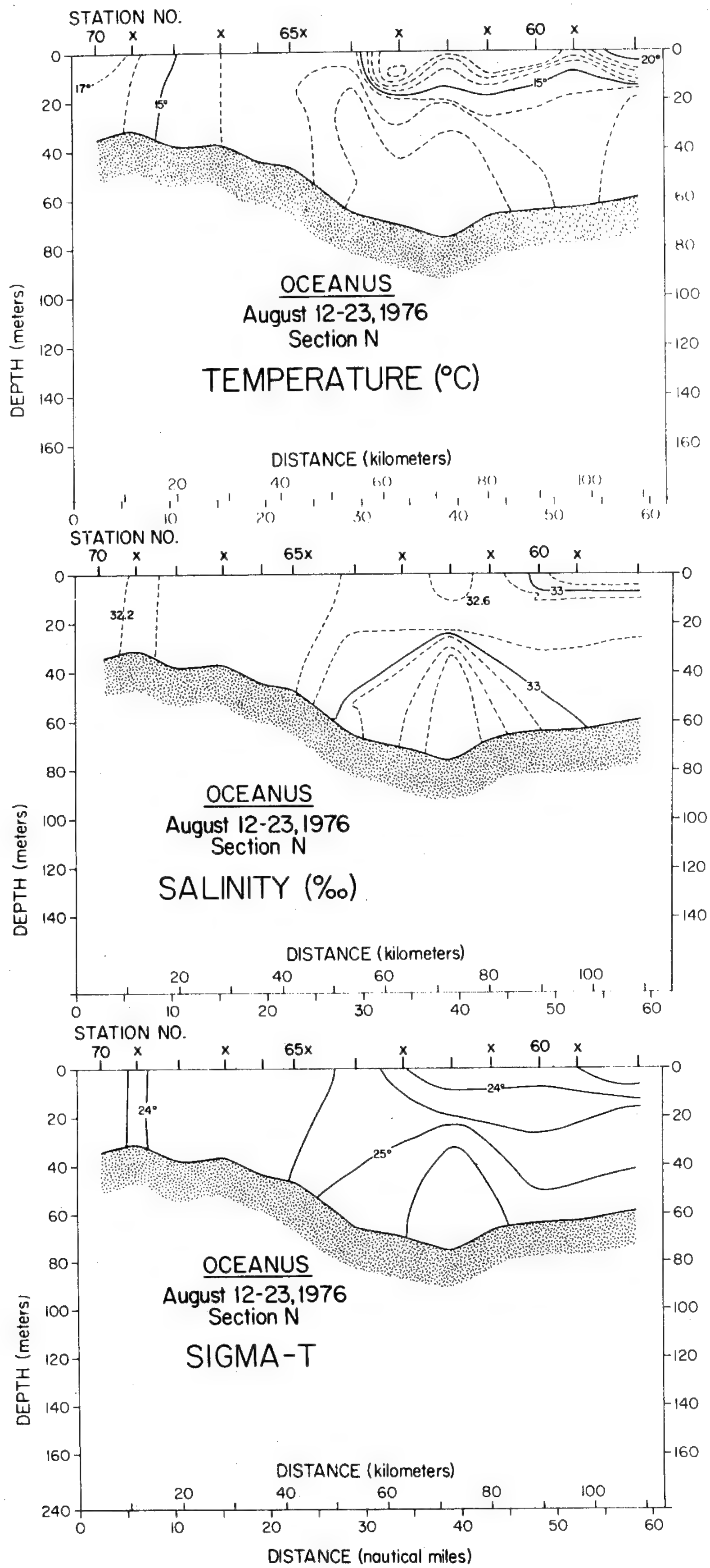
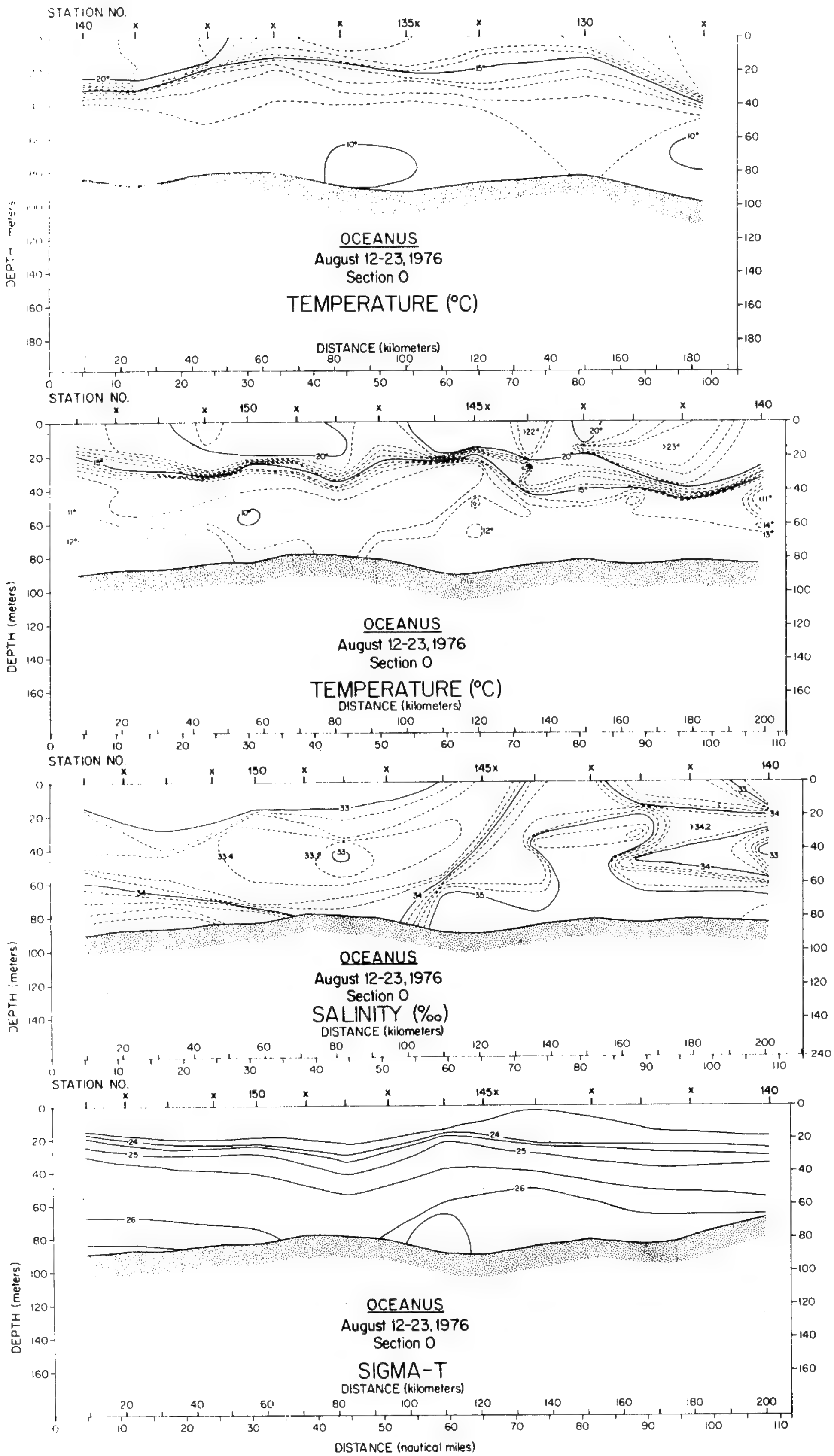

STATION NO.
70 x x 65x x x 60 x
17°
15°
20°
15°
DEPTH (meters)
OCEANUS
August 12-23, 1976
Section N
TEMPERATURE (°C)
DISTANCE (kilometers)
STATION NO.
70 x x 65x x x 60 x
32.2
32.6
33
33
OCEANUS
August 12-23, 1976
Section N
SALINITY (‰)
DISTANCE (kilometers)
STATION NO.
70 x x 65x x x 60 x
24°
24°
25°
OCEANUS
August 12-23, 1976
Section N
SIGMA-T
DISTANCE (kilometers)
DISTANCE (nautical miles)

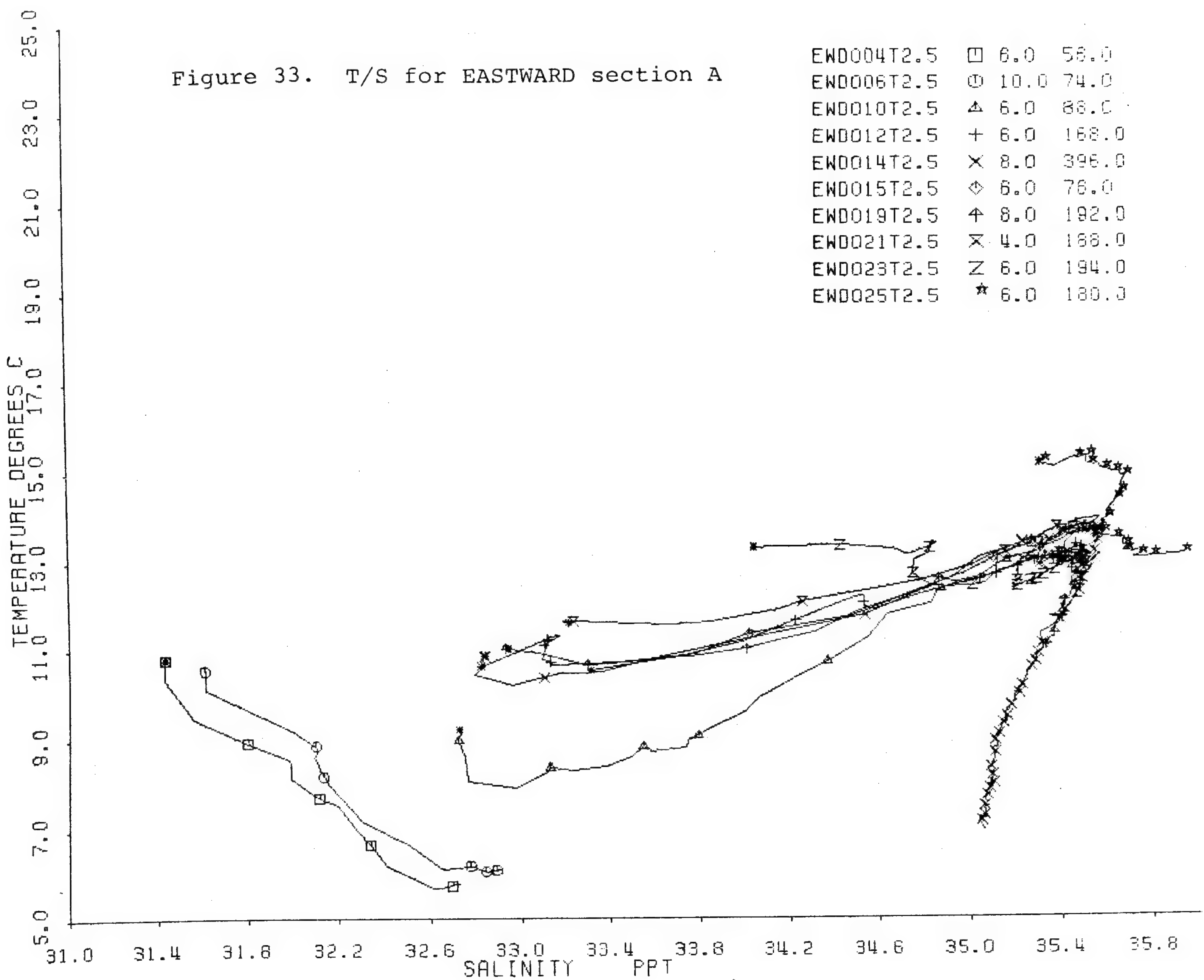
Figure 31.



STATION NO.
OCEANUS
August 12-23, 1976
Section O
TEMPERATURE (°C)
DISTANCE (kilometers)
DEPTH (meters)
OCEANUS
August 12-23, 1976
Section O
TEMPERATURE (°C)
DISTANCE (kilometers)
OCEANUS
August 12-23, 1976
Section O
SALINITY (‰)
DISTANCE (kilometers)
OCEANUS
August 12-23, 1976
Section O
SIGMA-T
DISTANCE (kilometers)
DISTANCE (nautical miles)

Figure 32.

Figure 33. T/S for EASTWARD section A



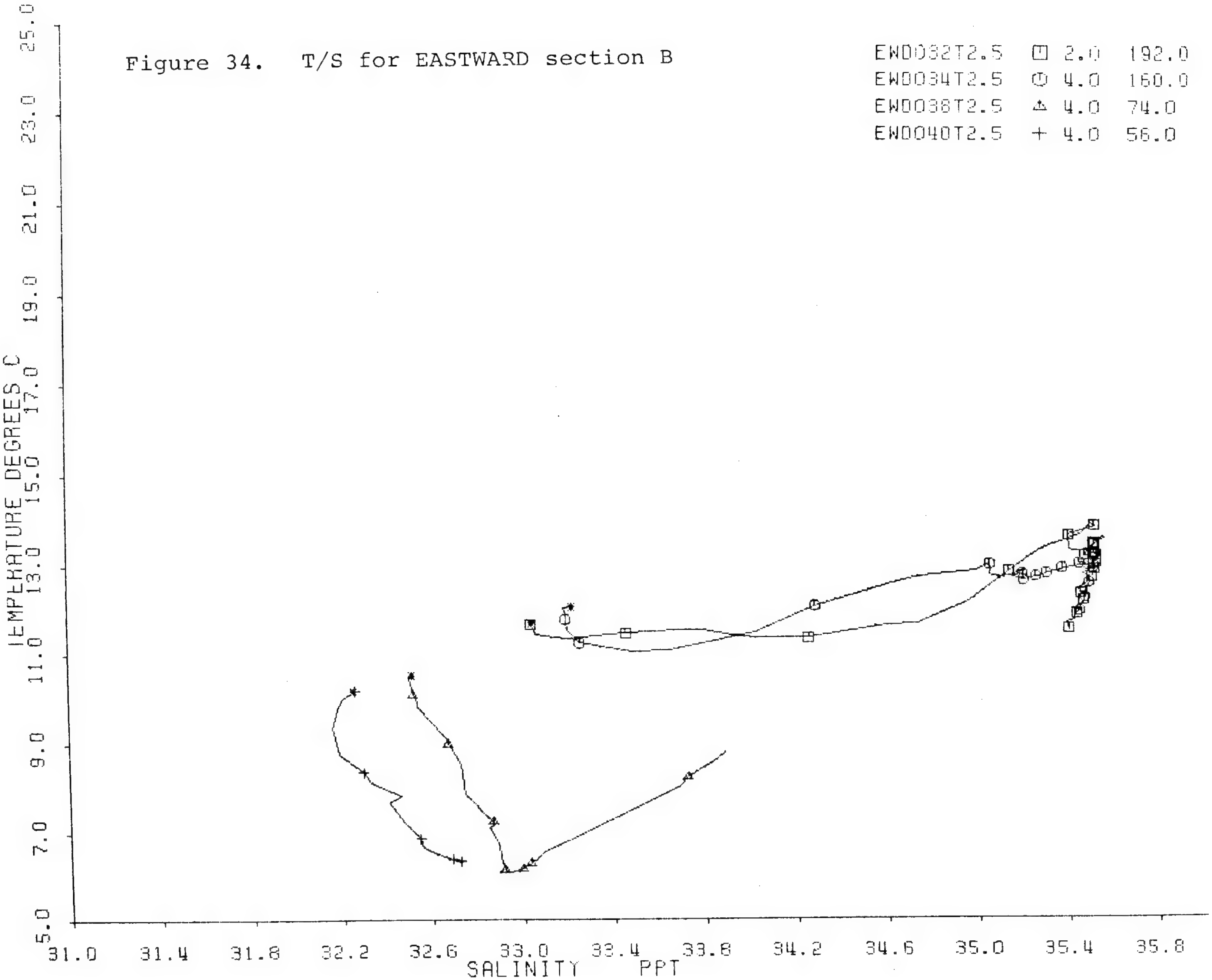


Figure 34. T/S for EASTWARD section B

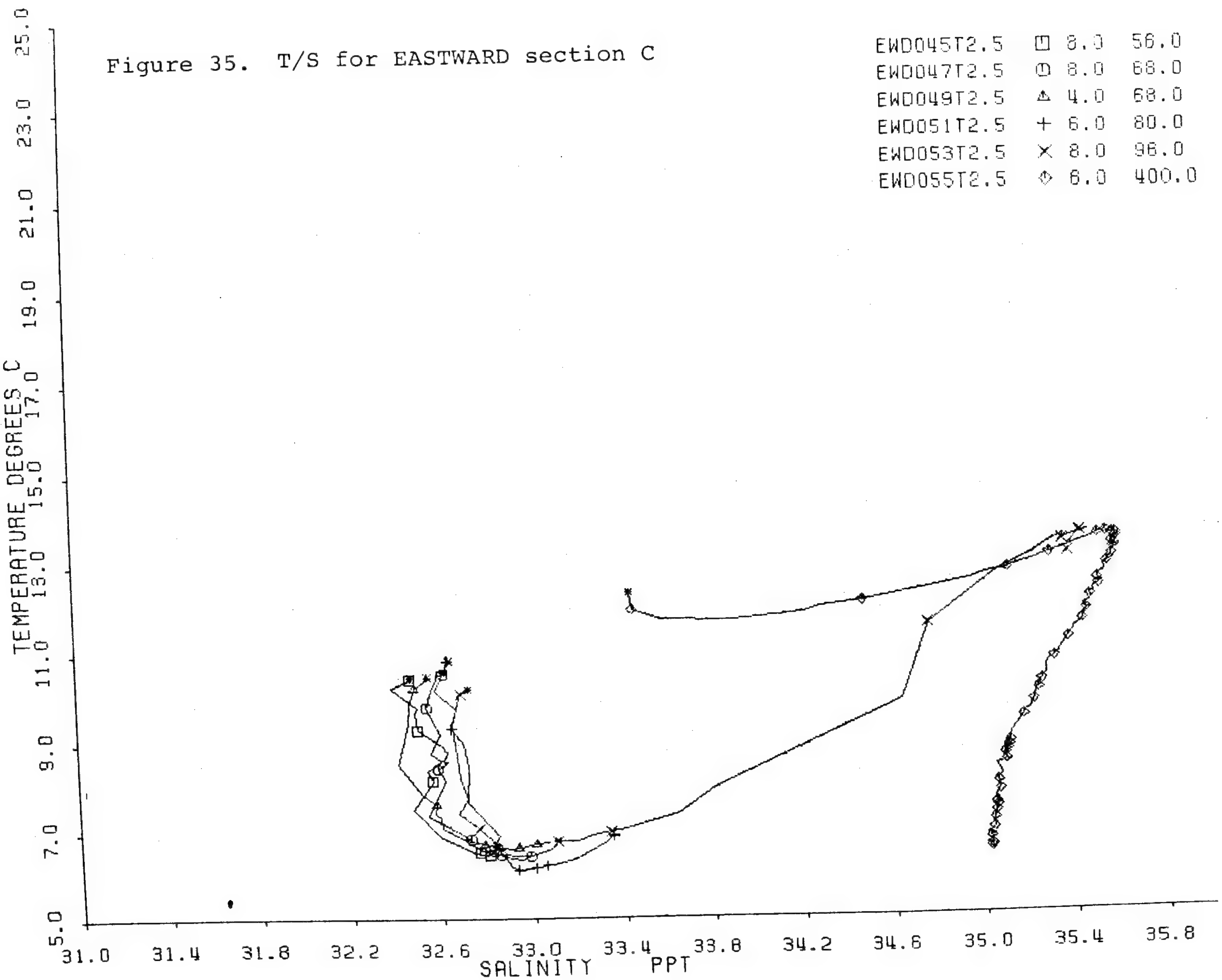


Figure 35. T/S for EASTWARD section C

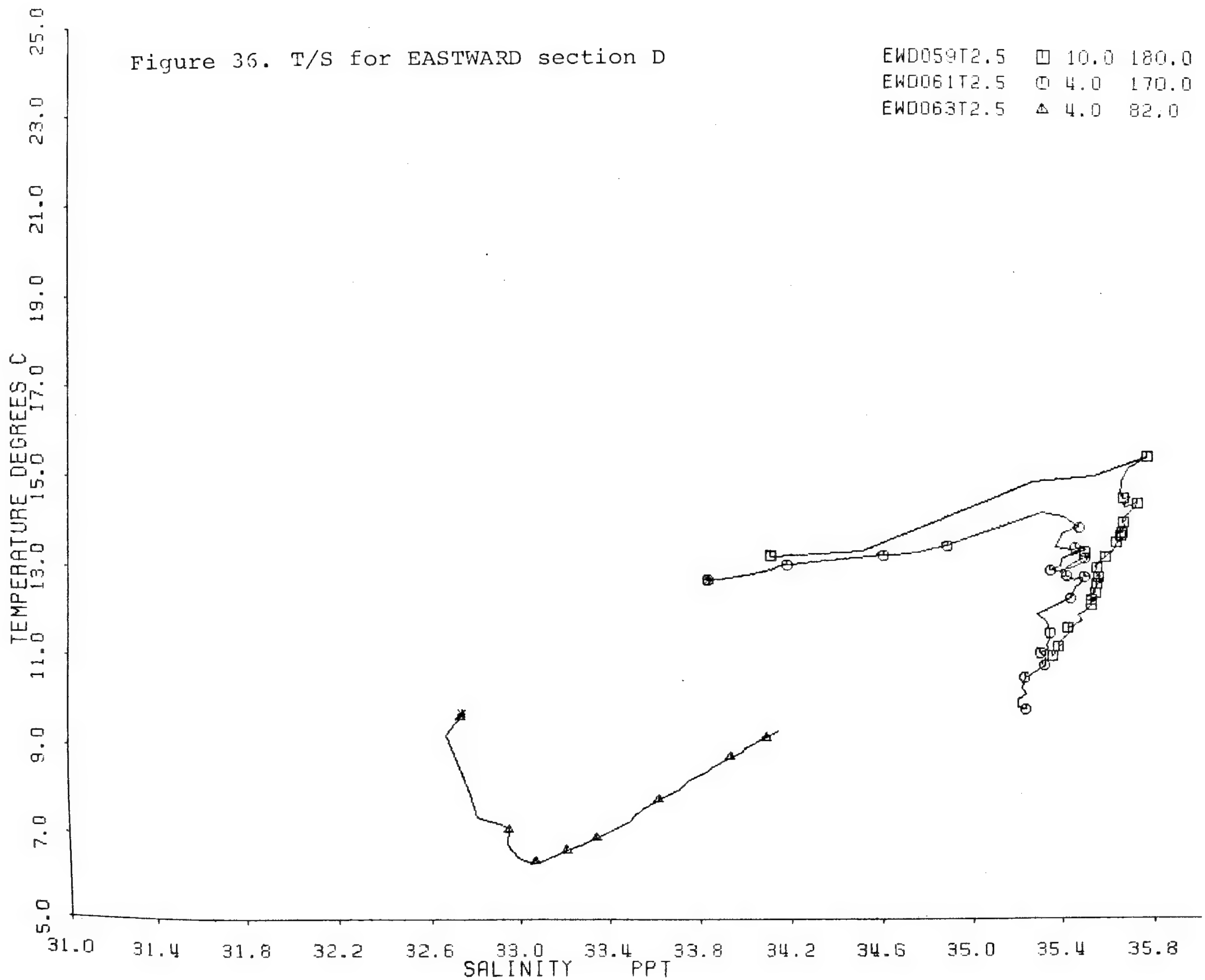


Figure 36. T/S for EASTWARD section D

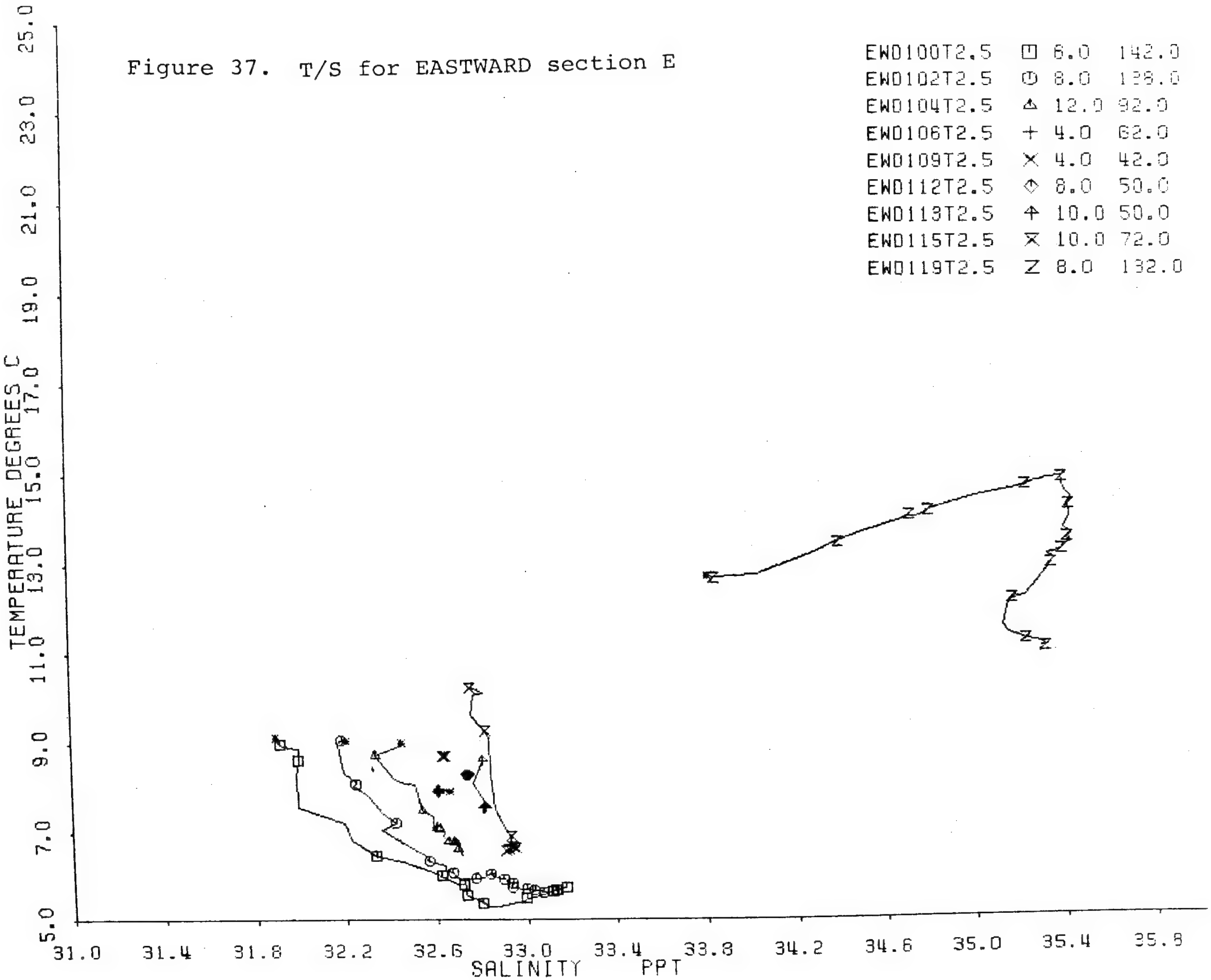
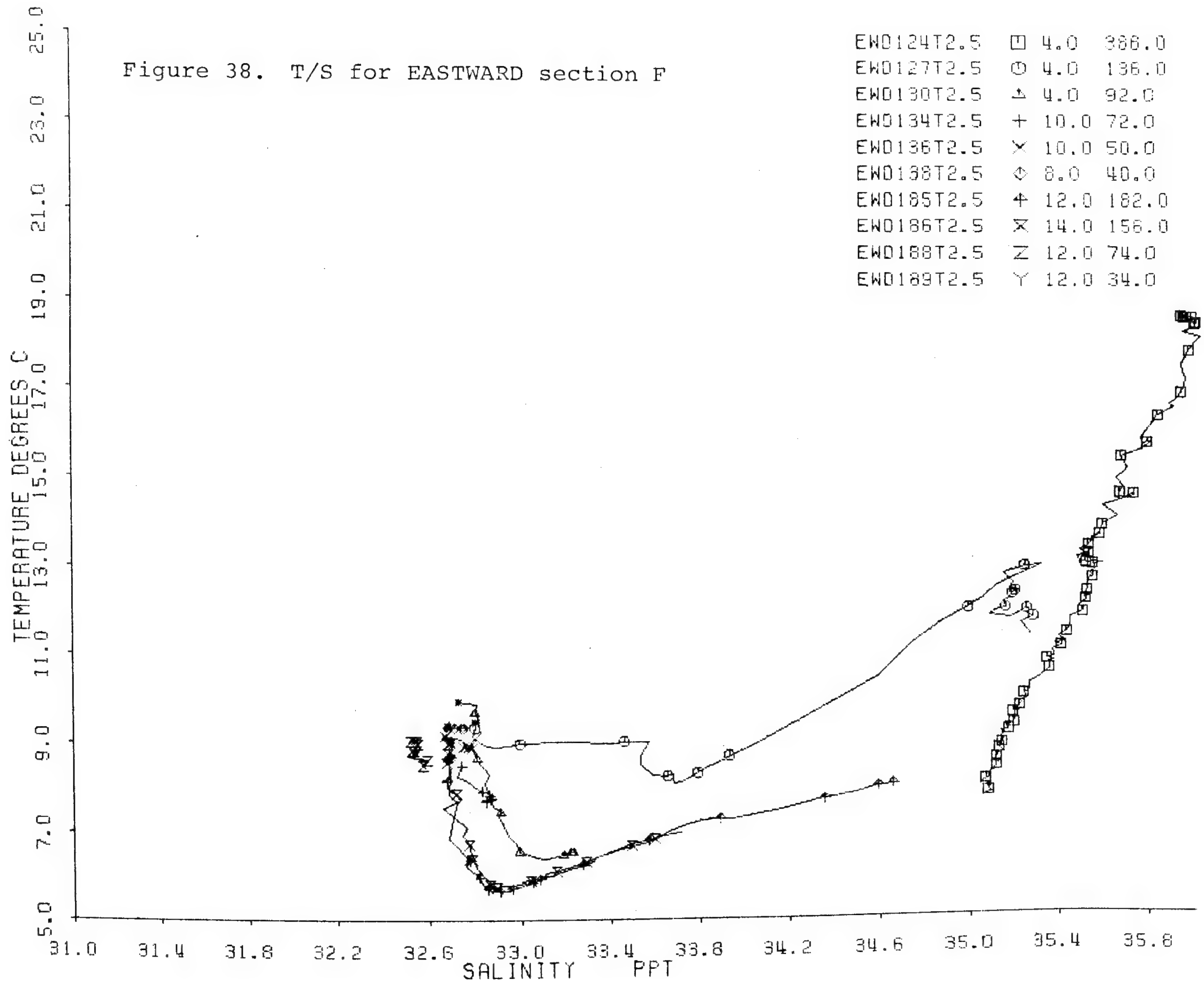


Figure 37. T/S for EASTWARD section E

Figure 38. T/S for EASTWARD section F



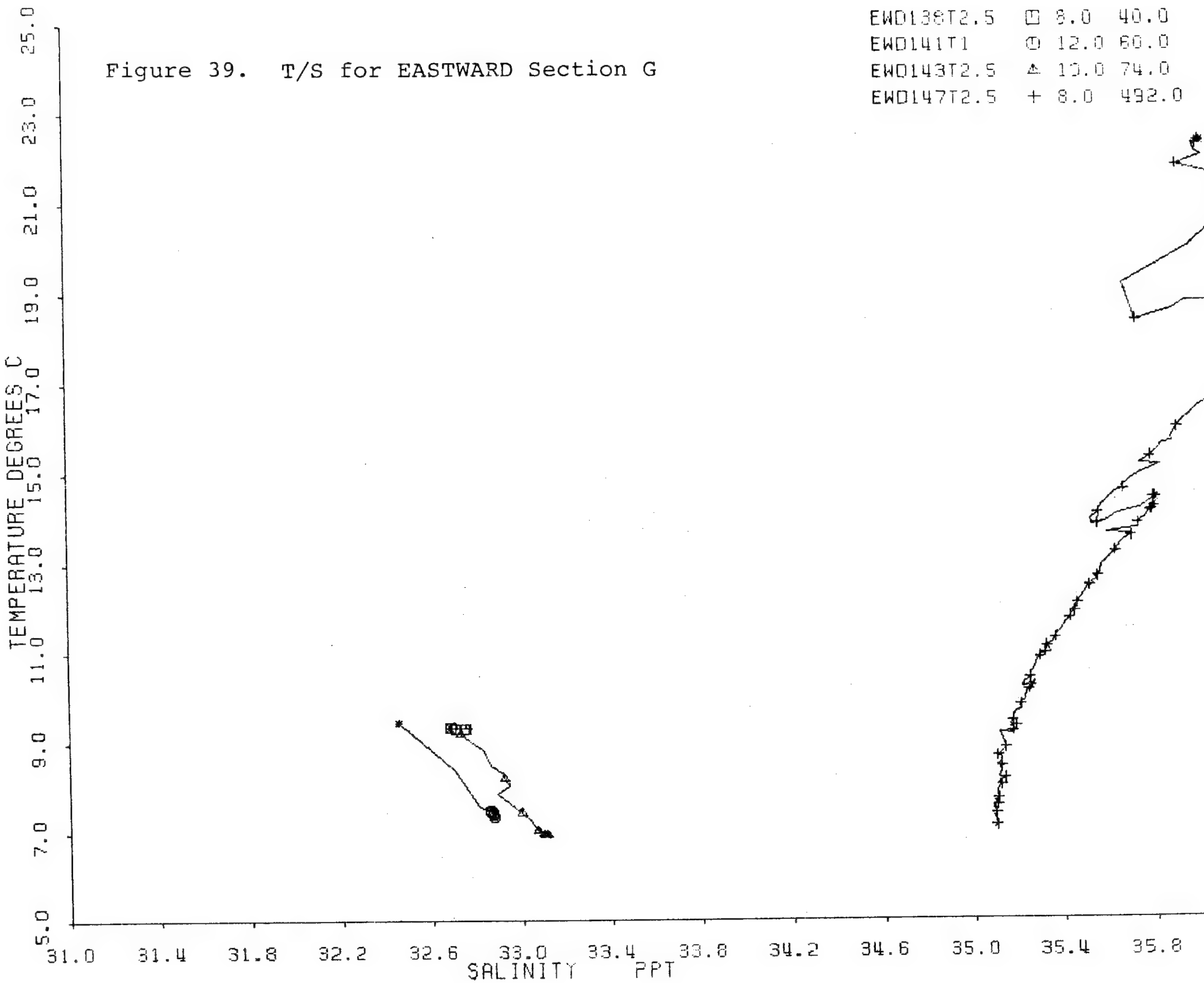


Figure 39. T/S for EASTWARD Section G

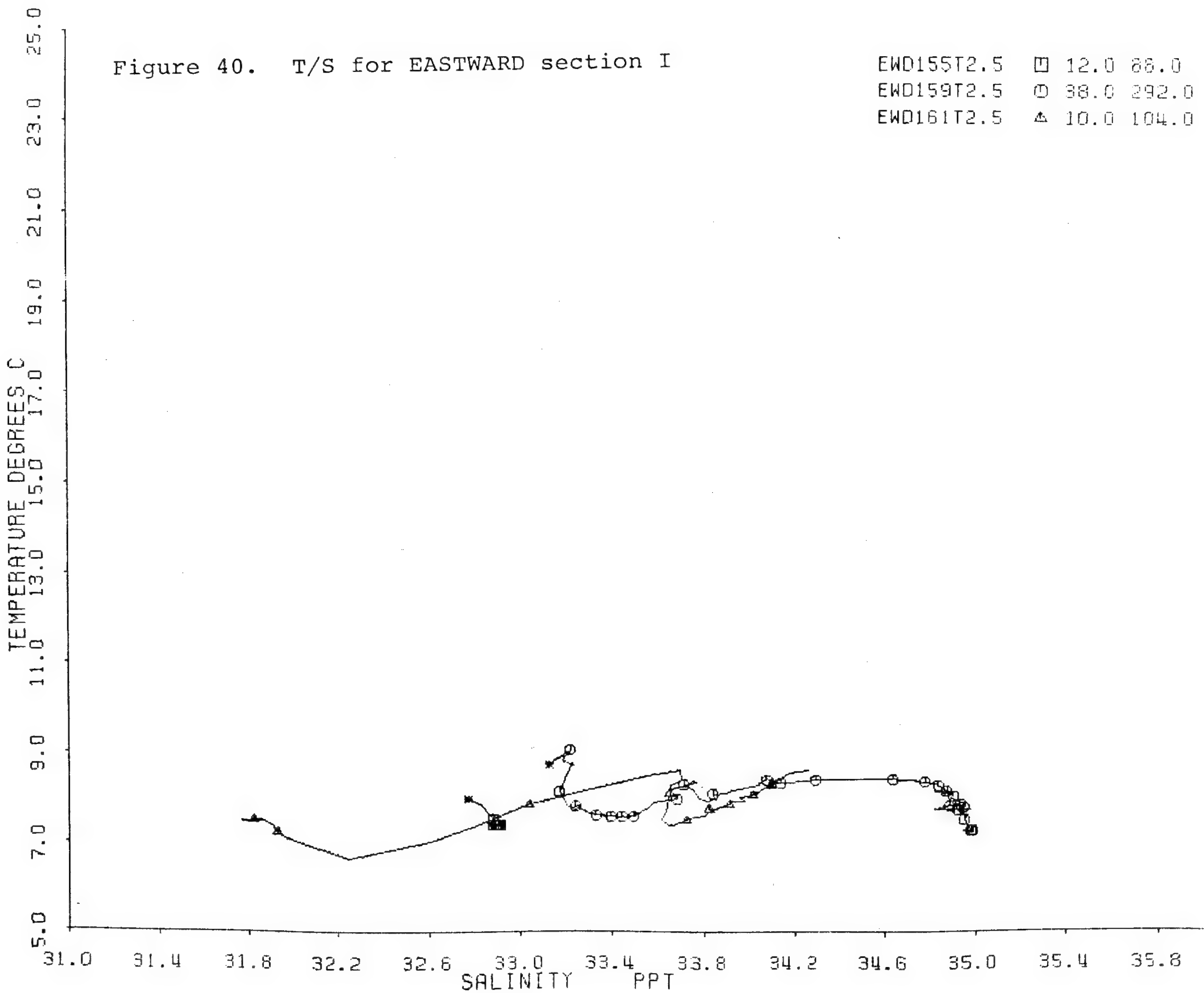


Figure 40. T/S for EASTWARD section I

Figure 41. T/S for EASTWARD section J

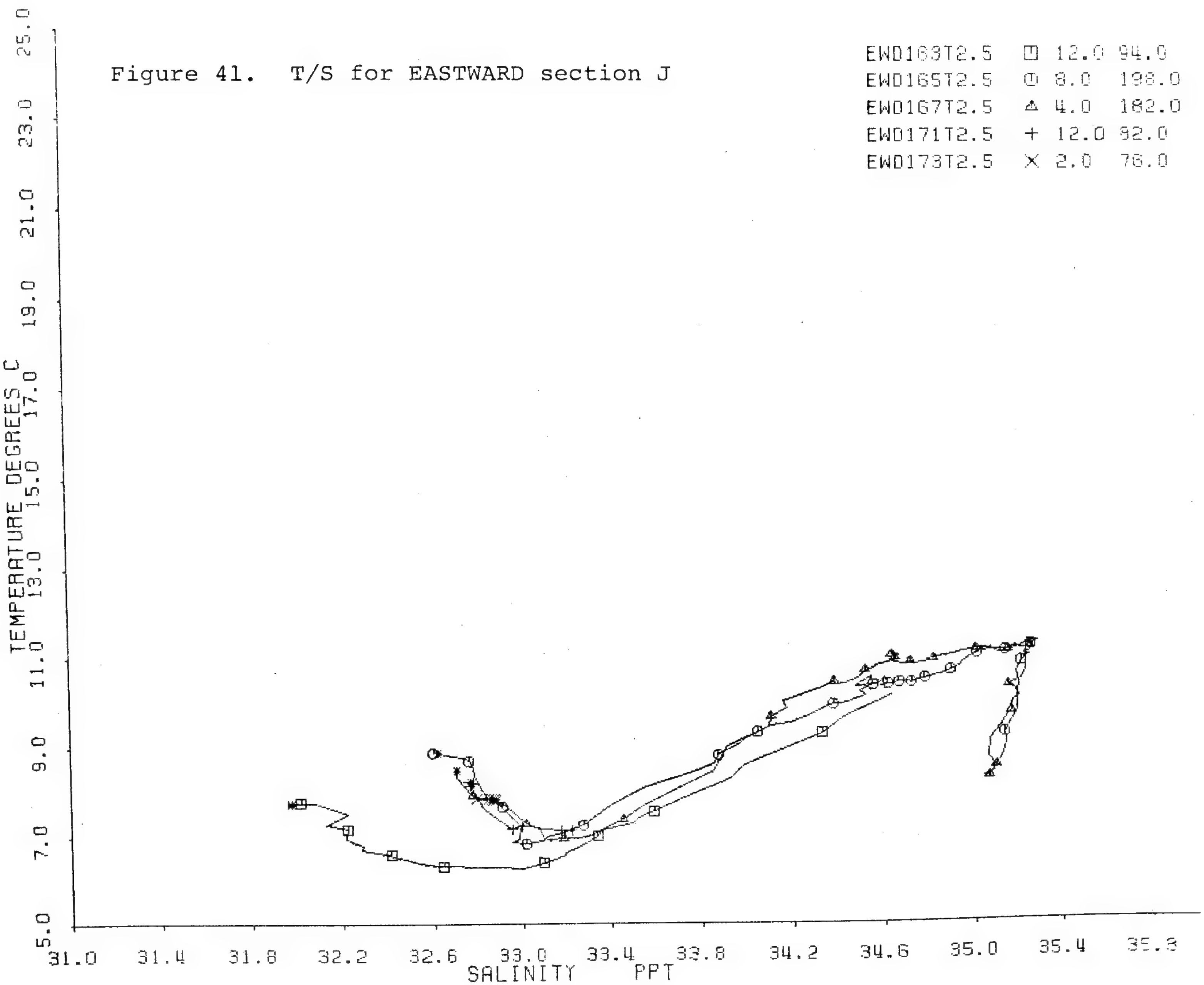


Figure 42. T/S for EASTWARD section K

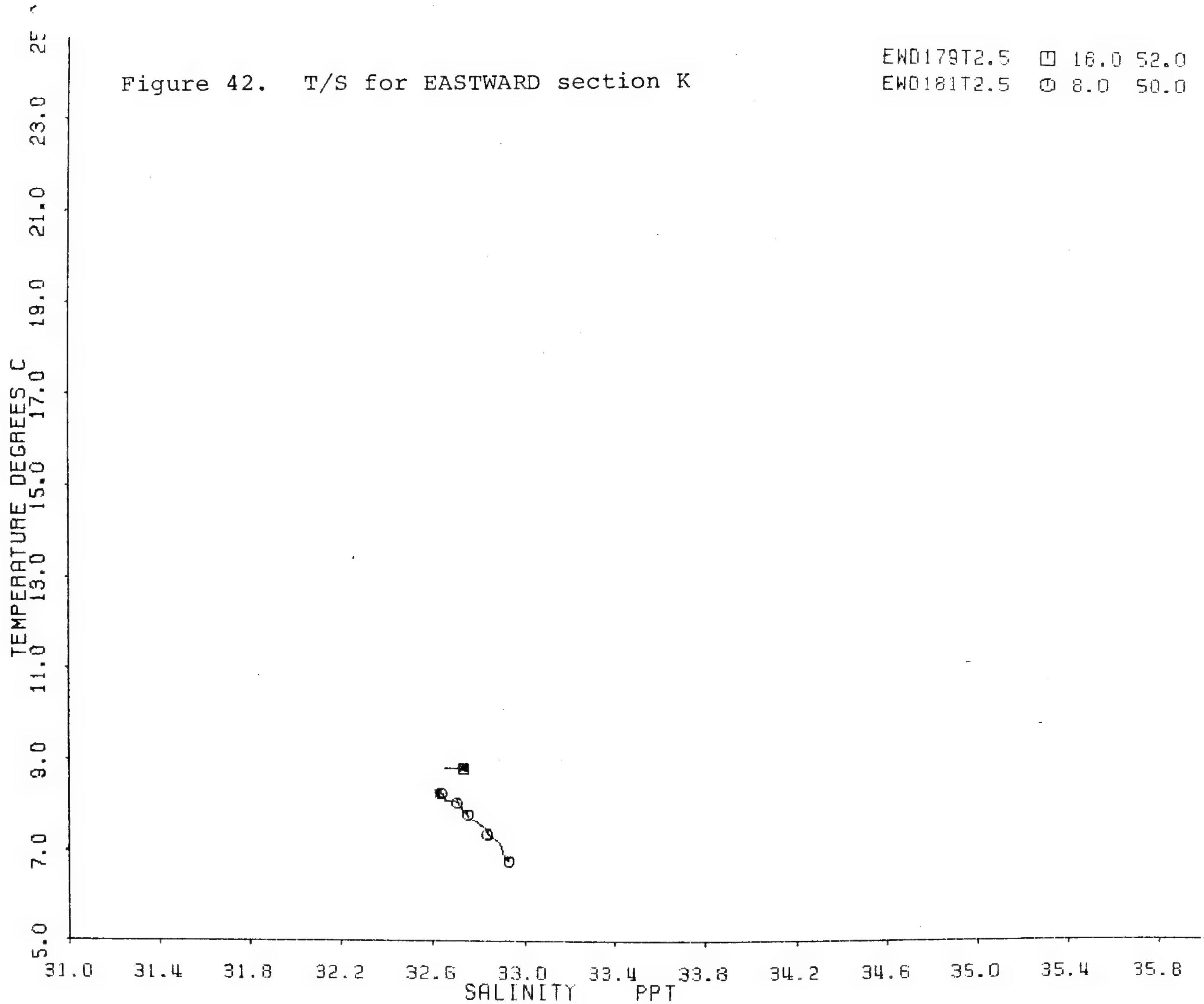


Figure 43. T/S for EASTWARD section L

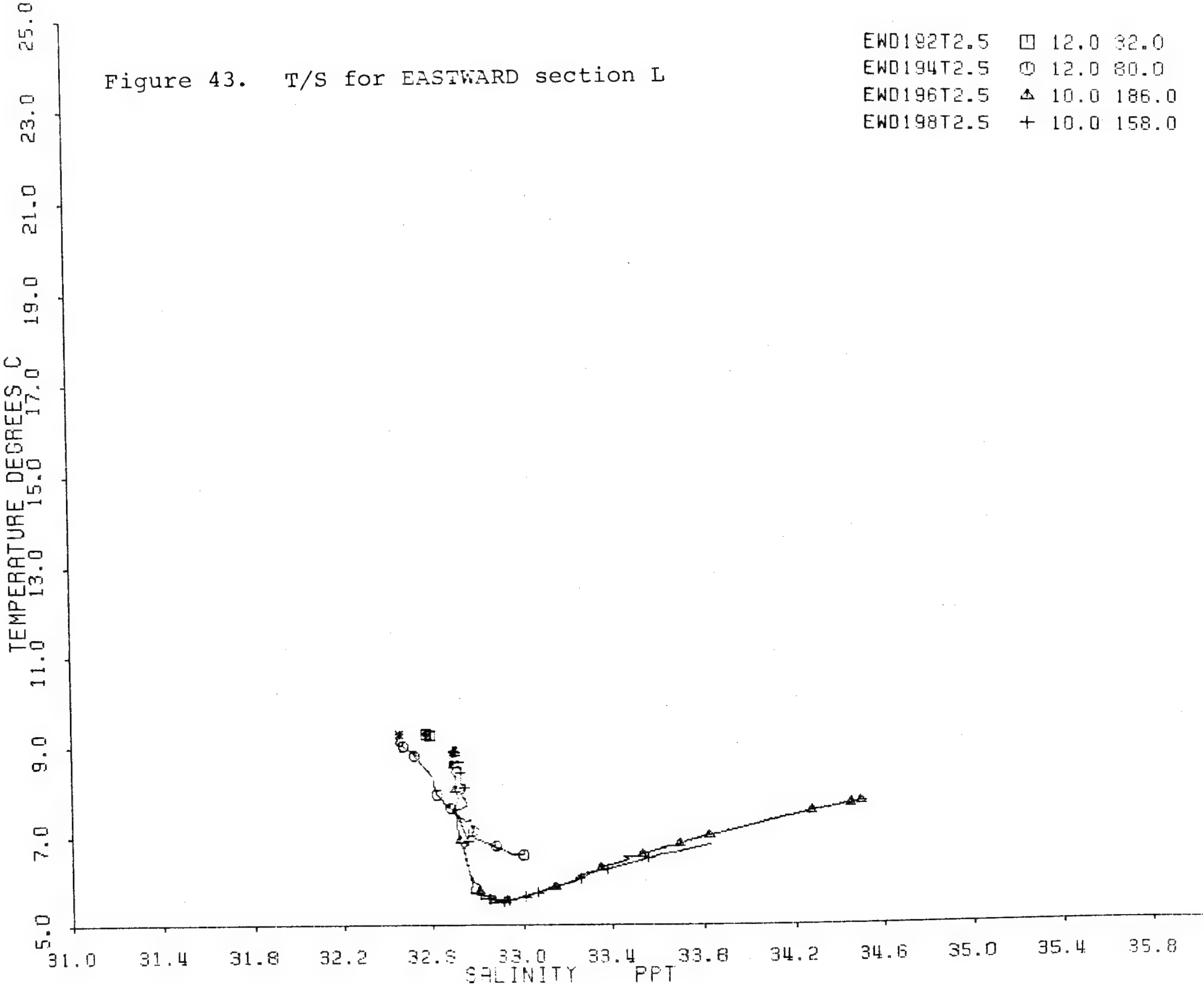
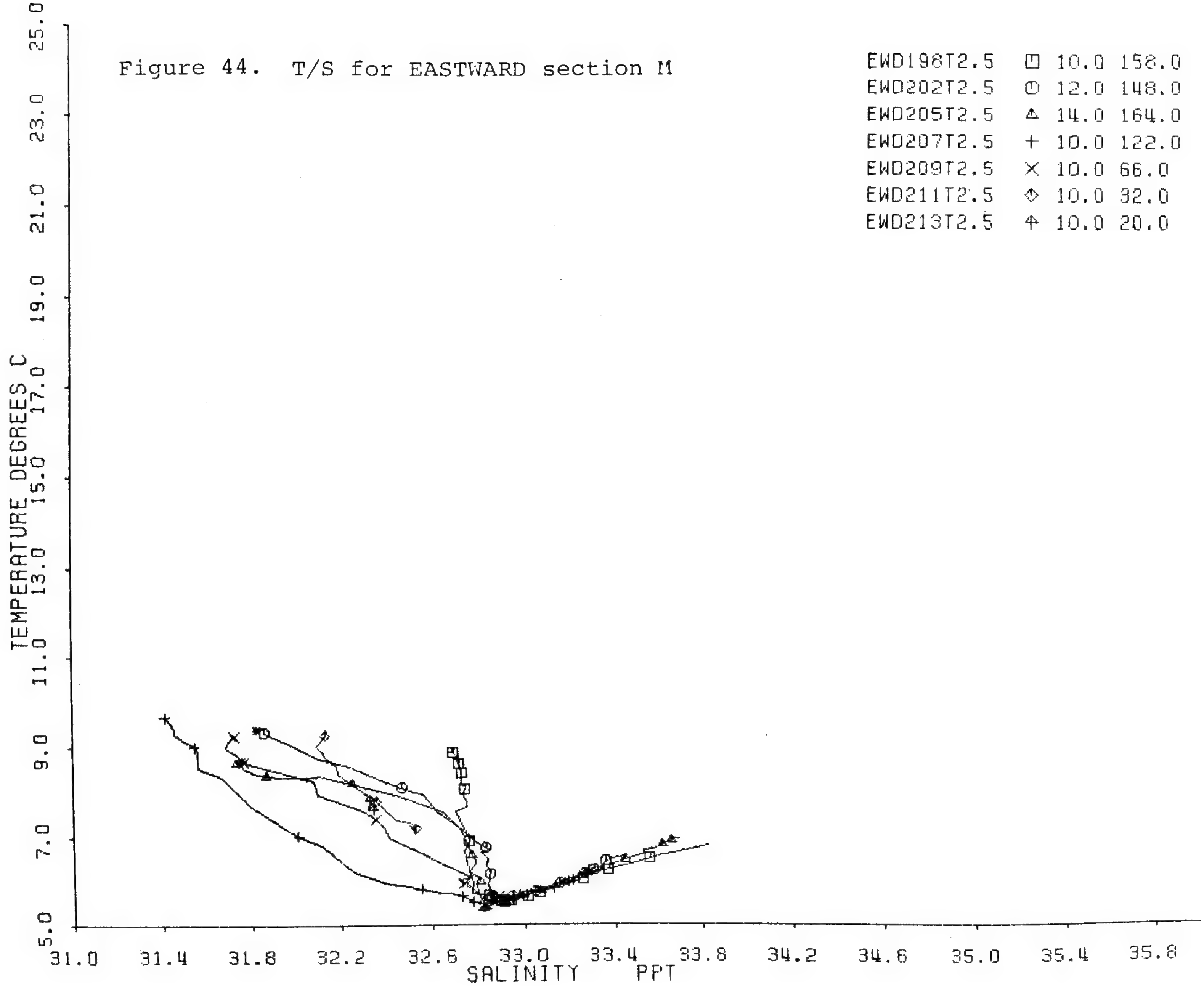


Figure 44. T/S for EASTWARD section M



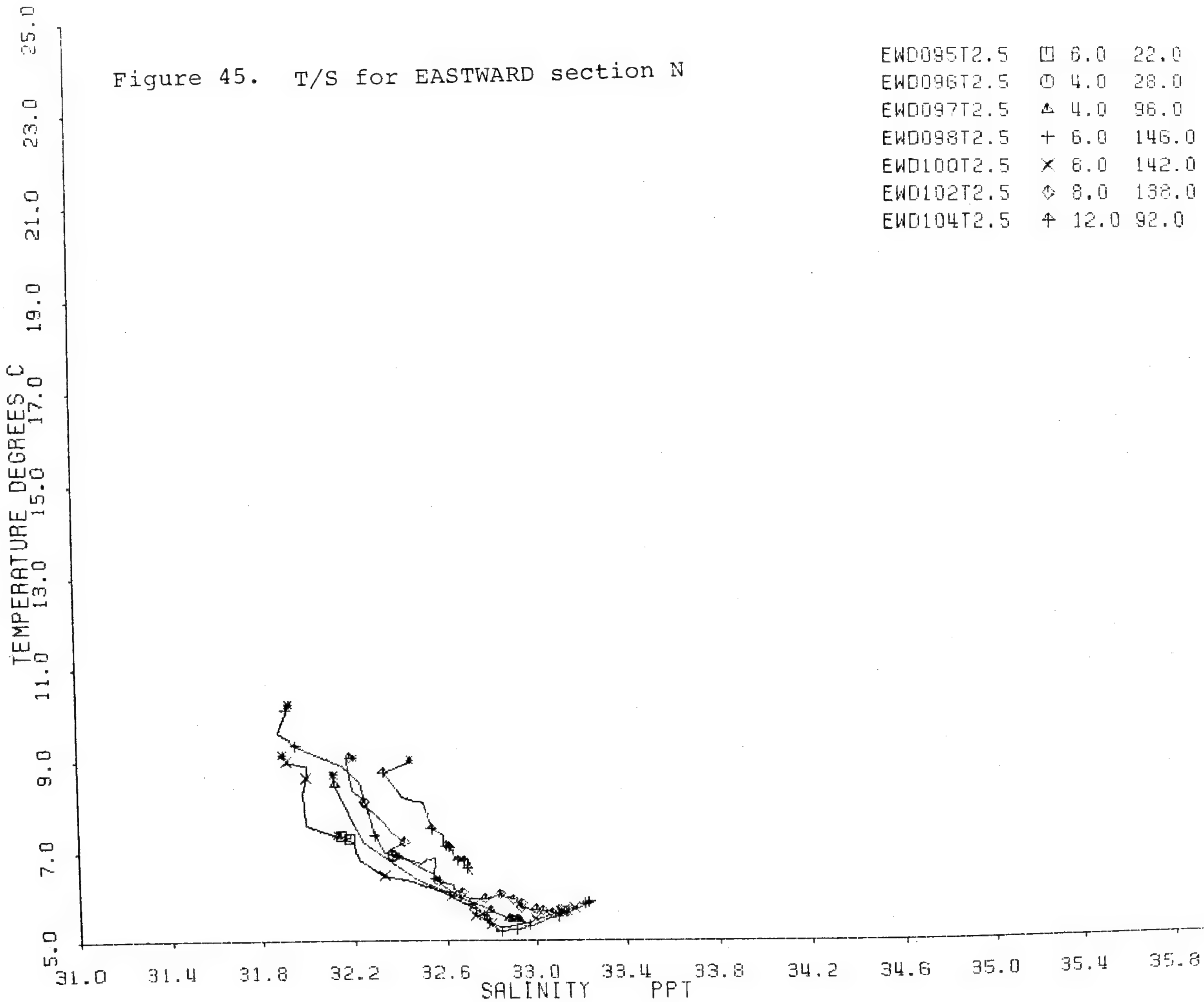


Figure 45. T/S for EASTWARD section N

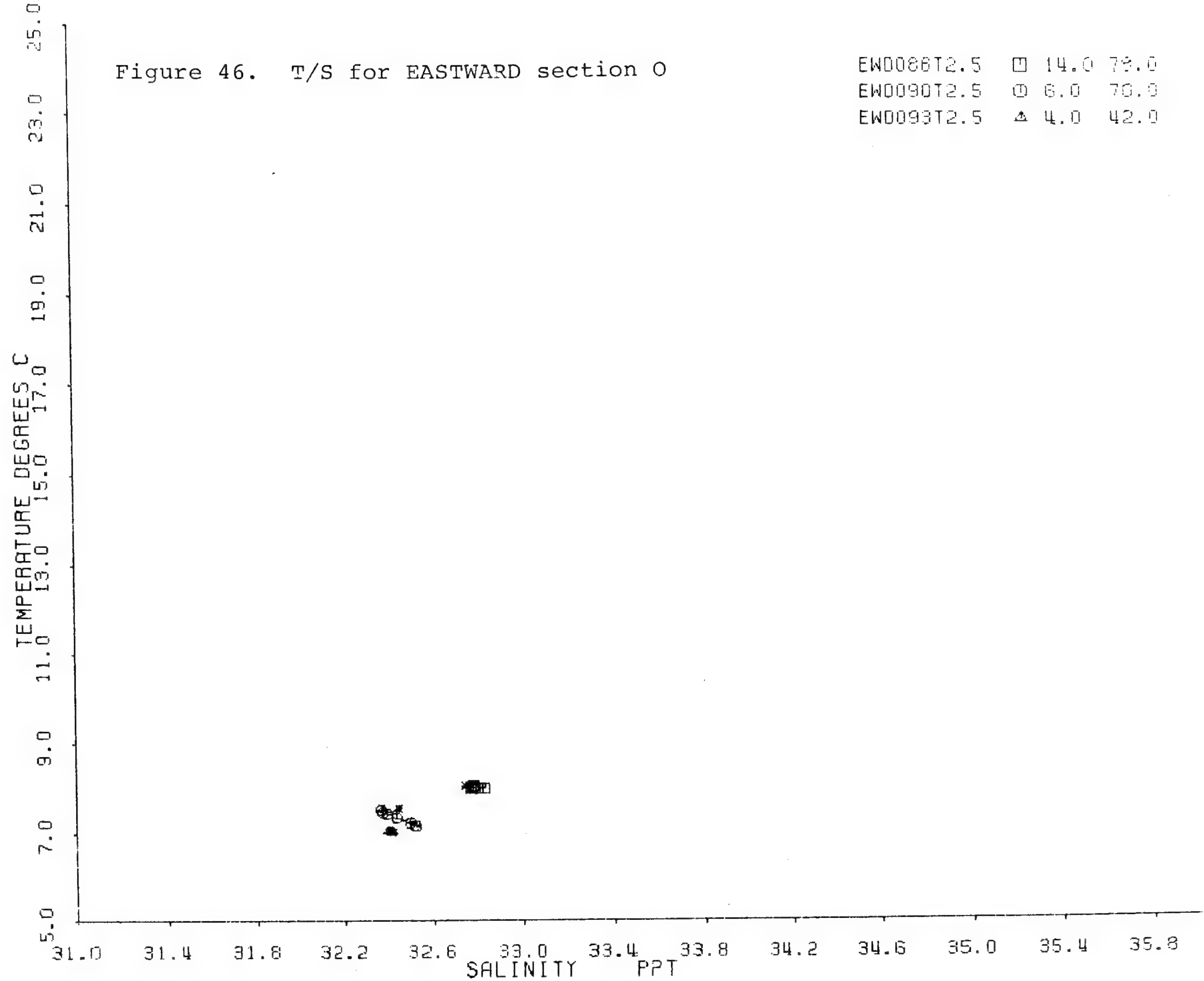


Figure 46. T/S for EASTWARD section O

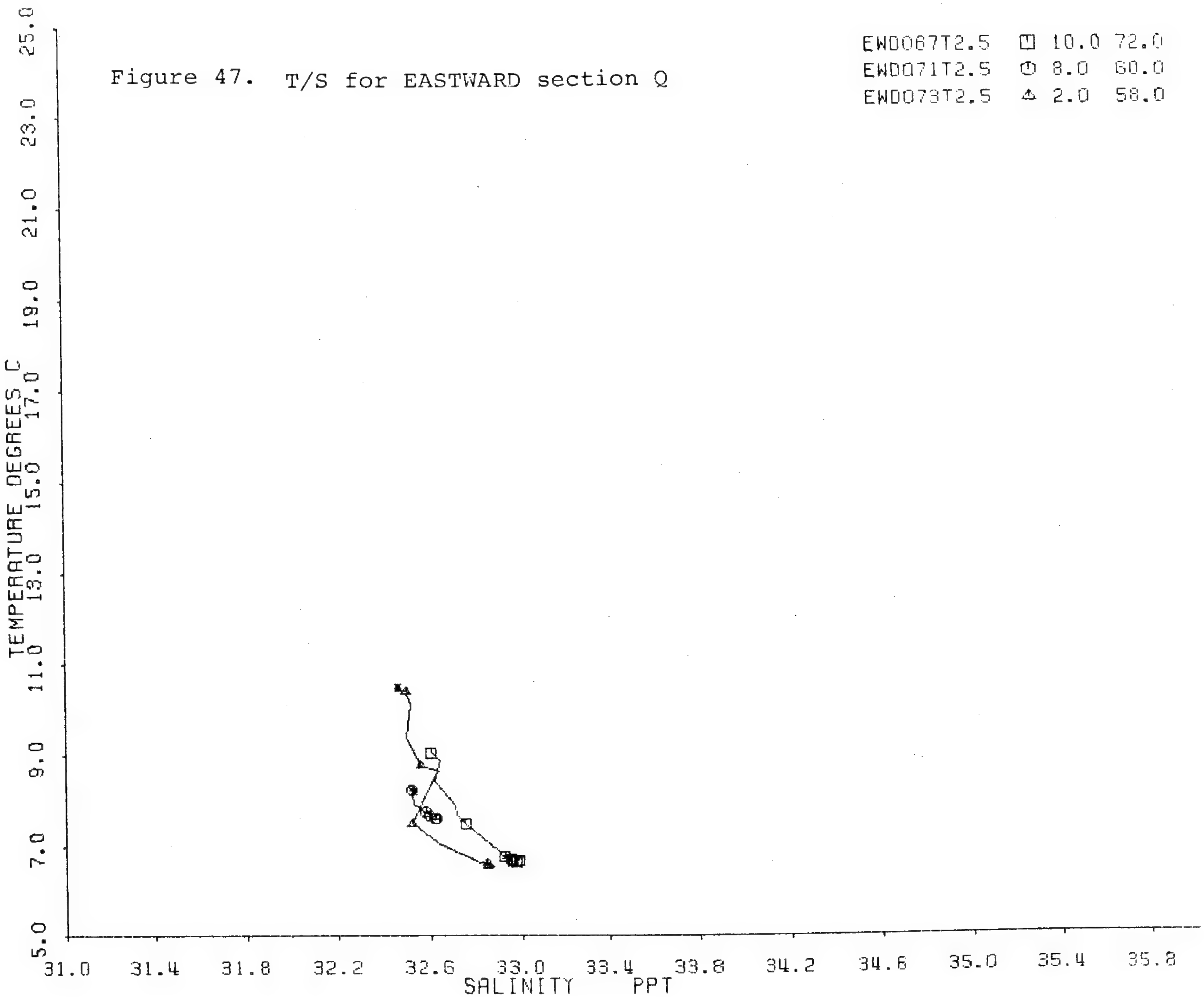


Figure 47. T/S for EASTWARD section Q

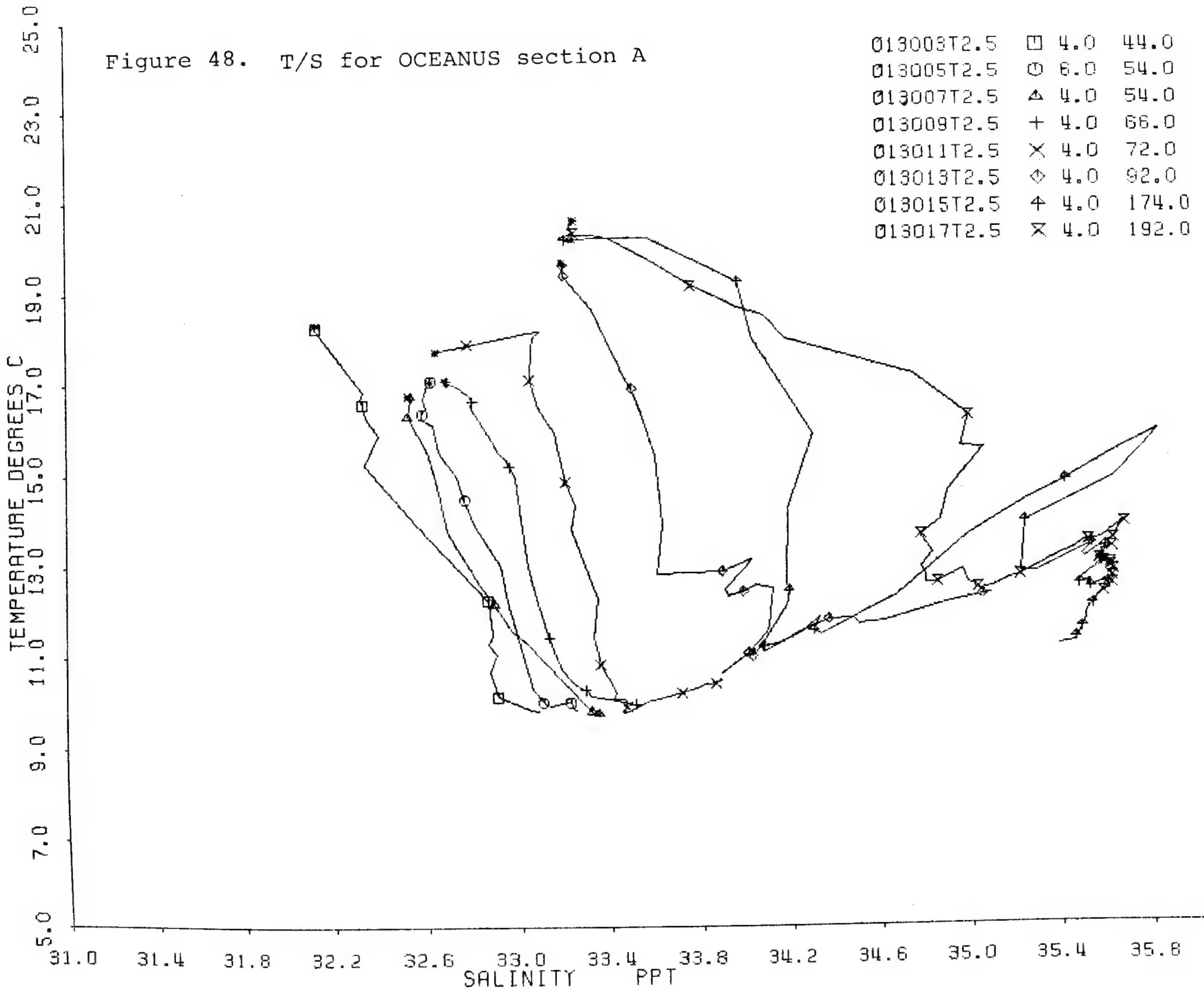


Figure 48. T/S for OCEANUS section A

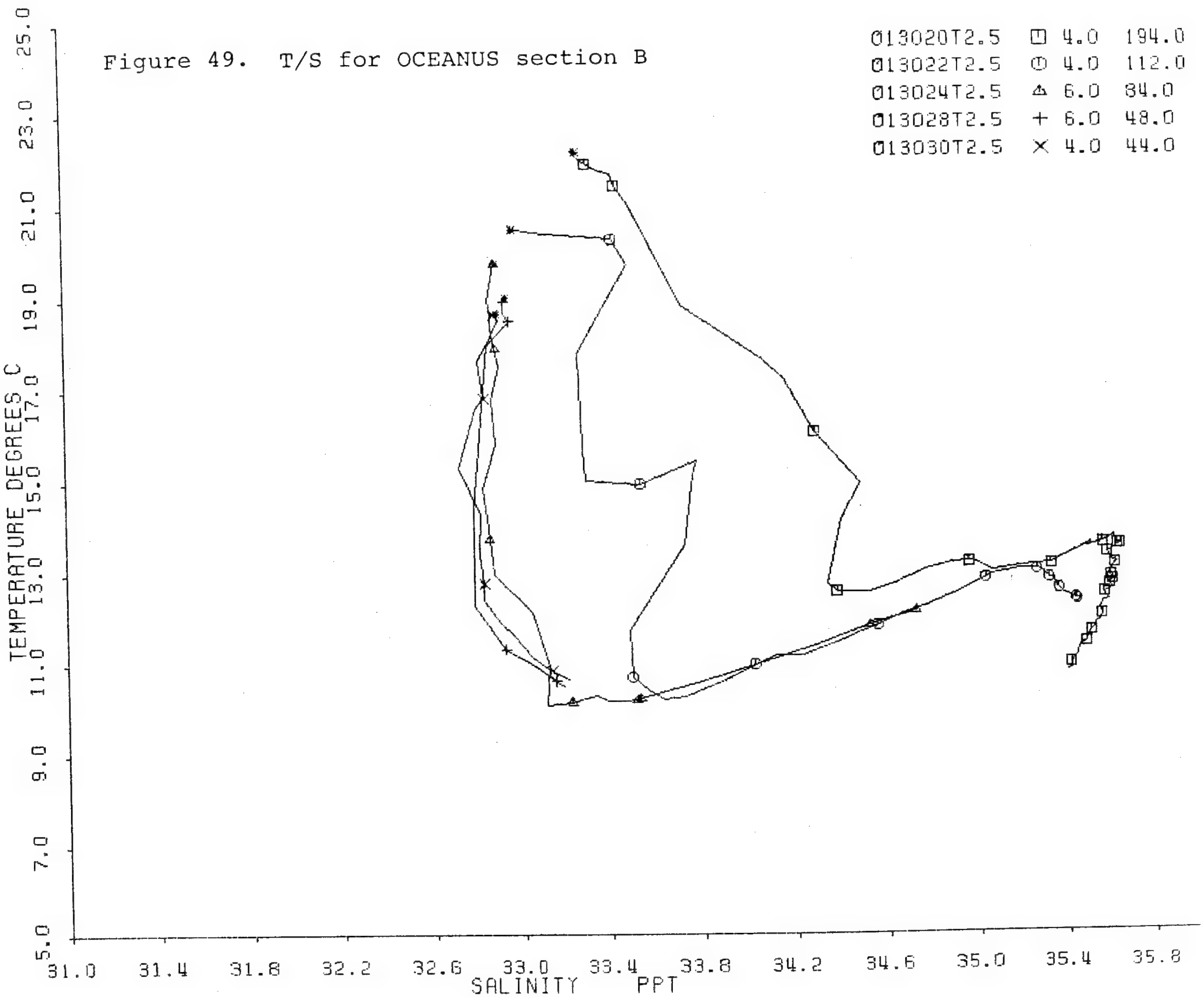
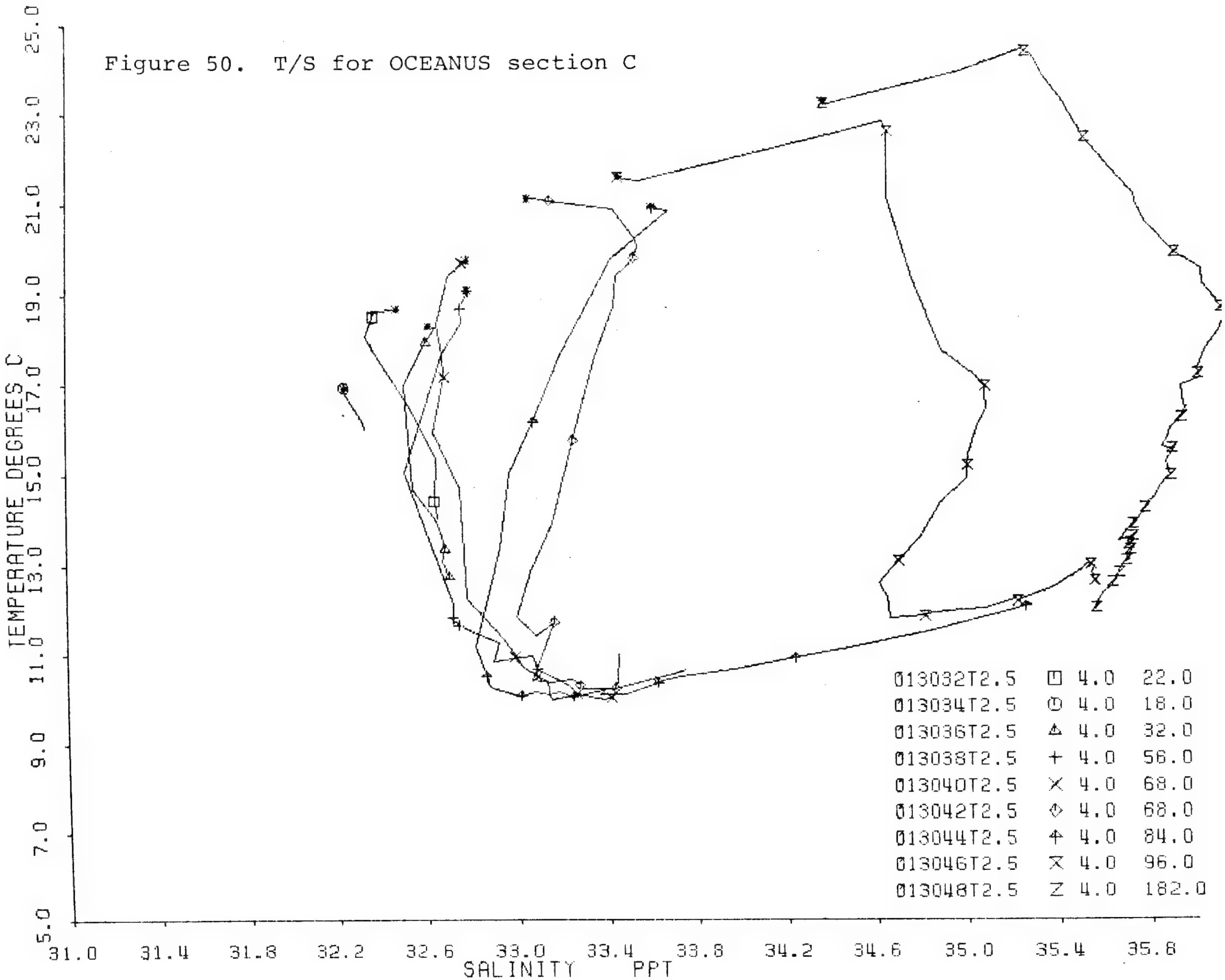


Figure 49. T/S for OCEANUS section B

Figure 50. T/S for OCEANUS section C



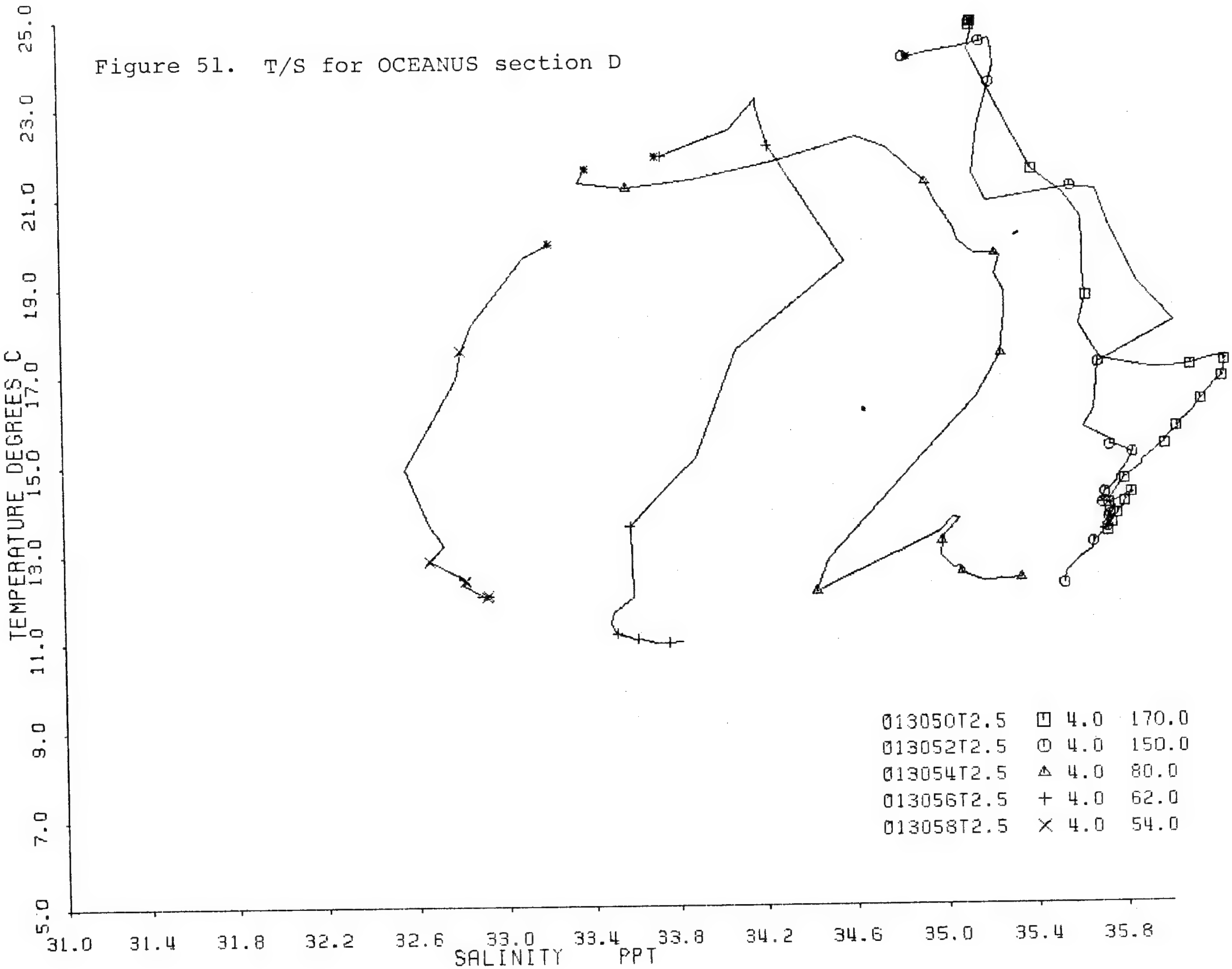


Figure 51. T/S for OCEANUS section D

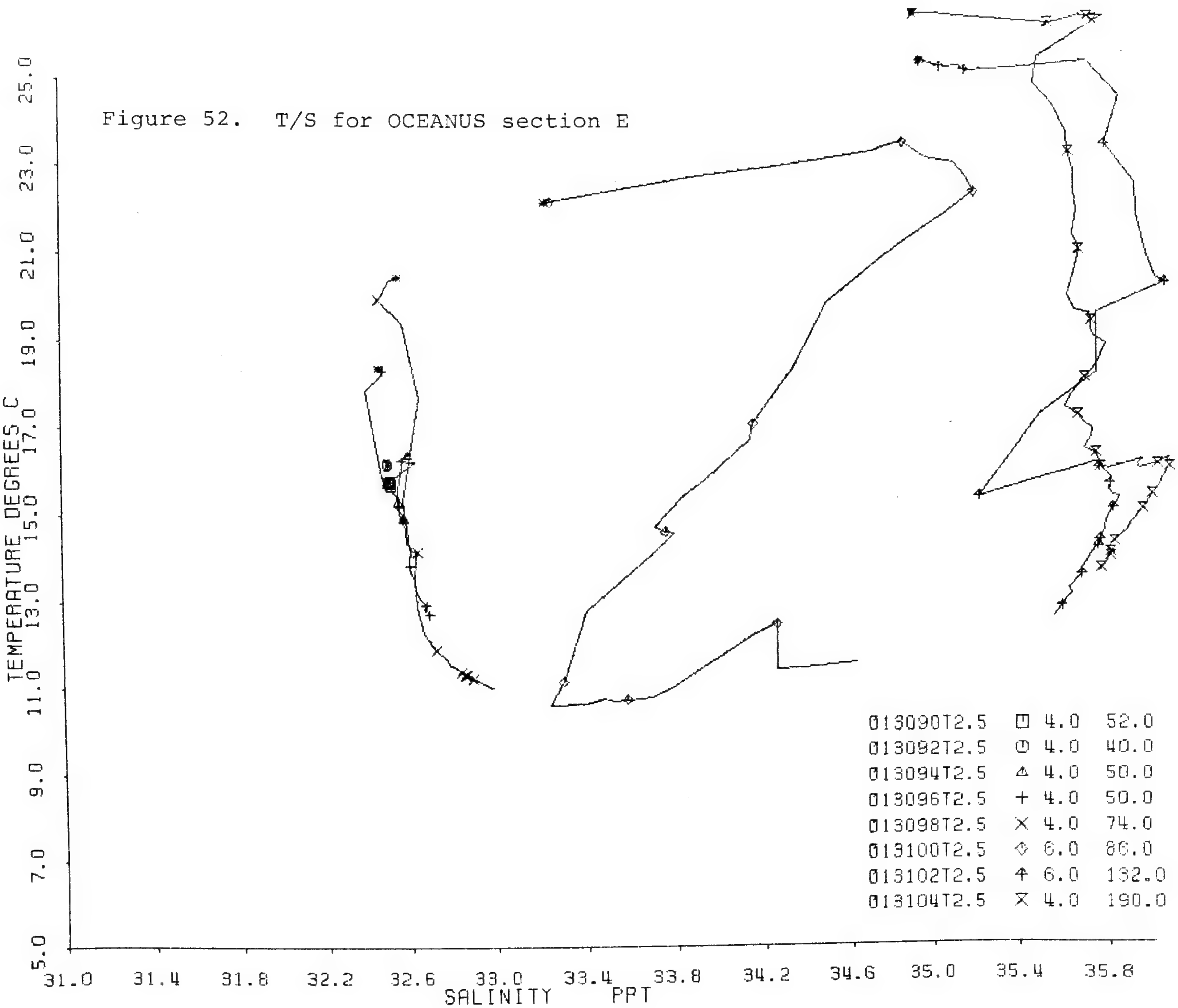


Figure 52. T/S for OCEANUS section E

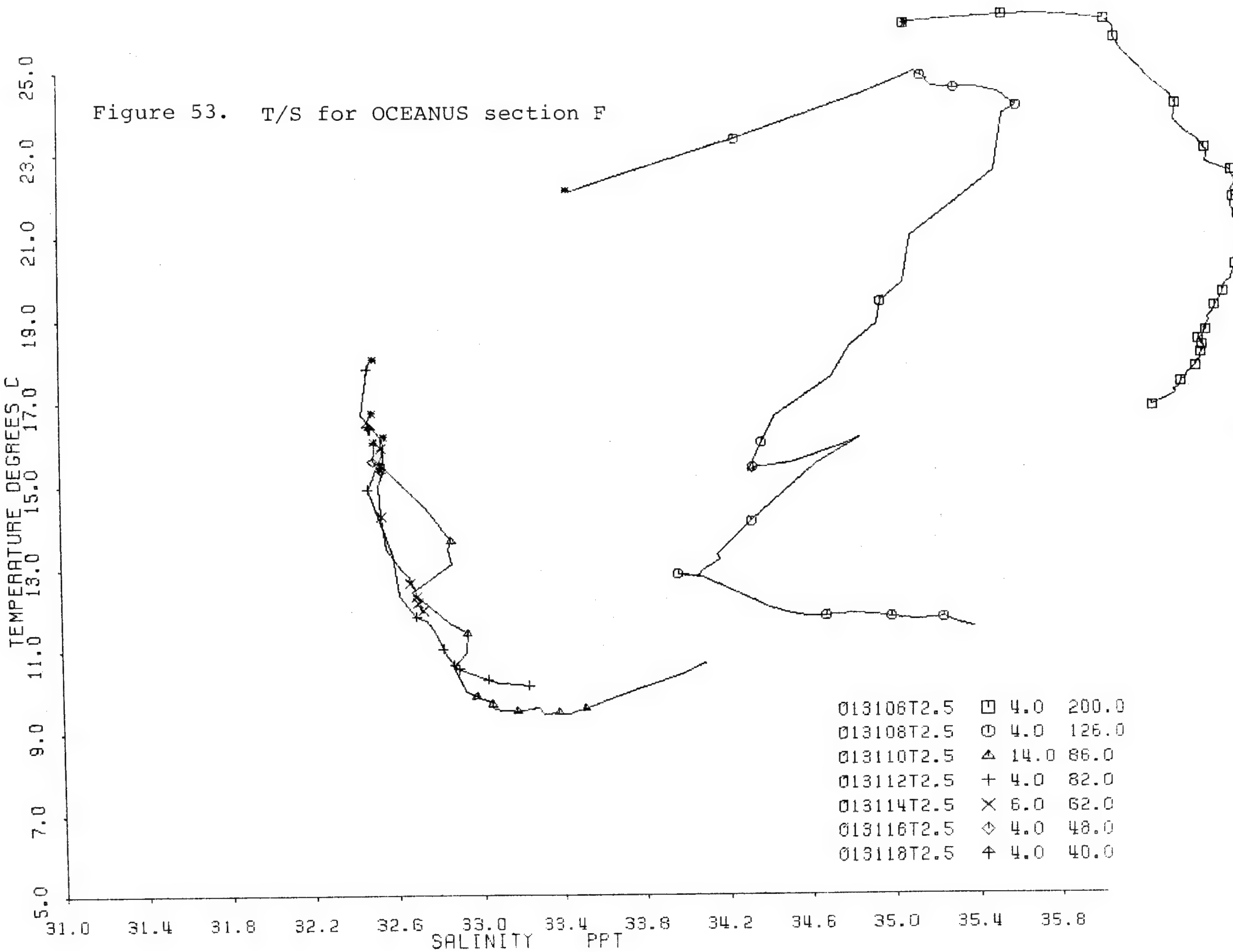


Figure 53. T/S for OCEANUS section F

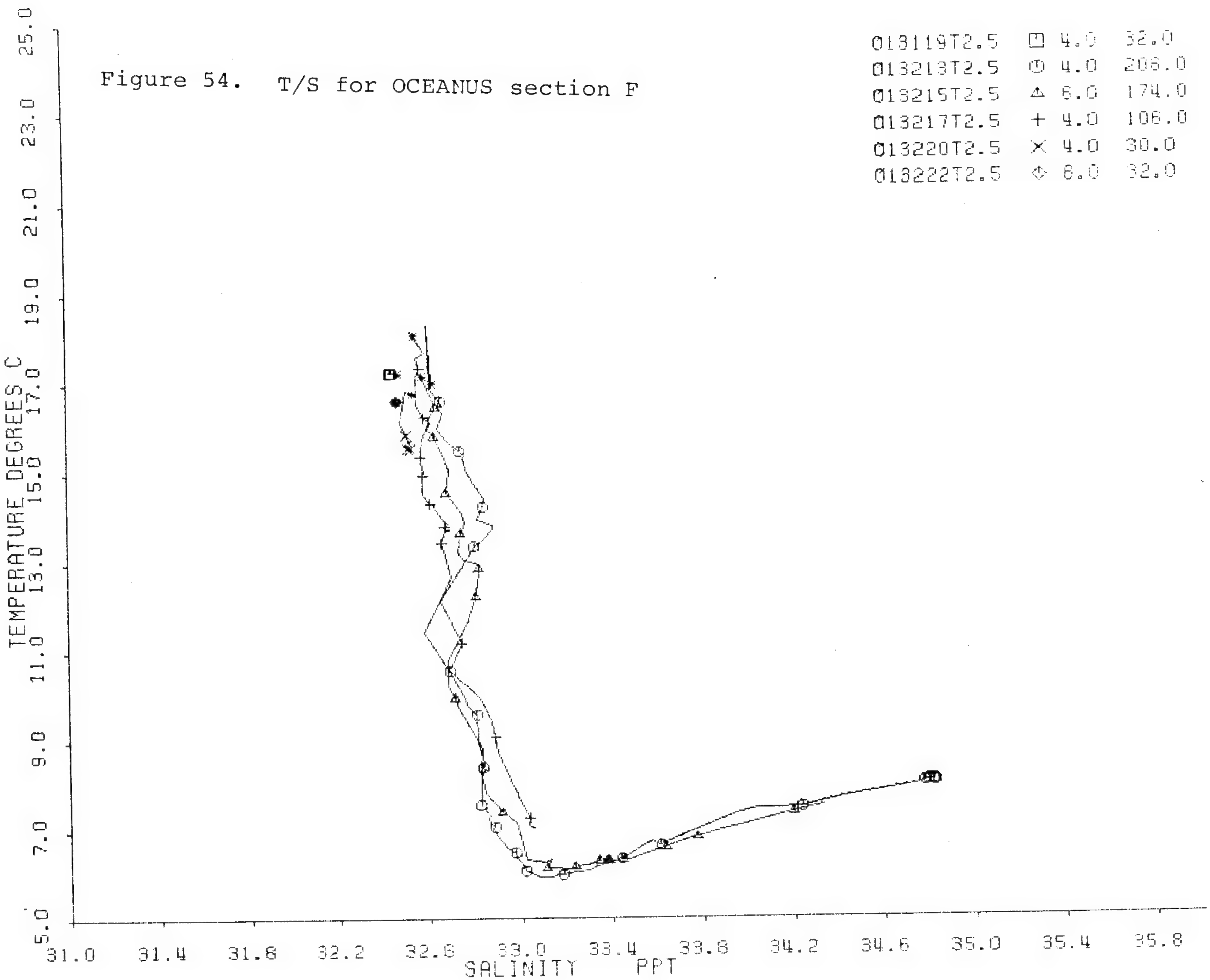


Figure 54. T/S for OCEANUS section F

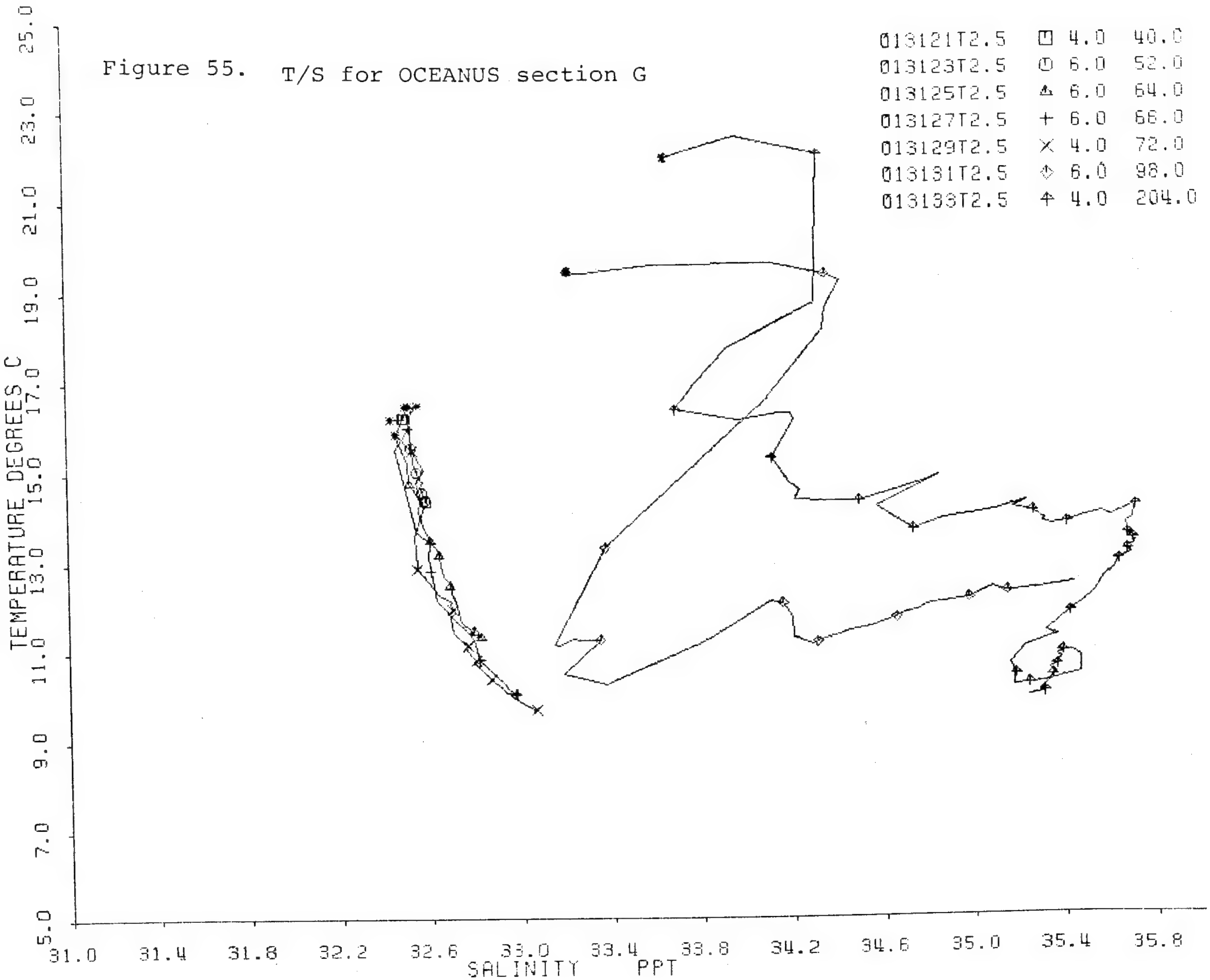


Figure 55. T/S for OCEANUS section G

Figure 56. T/S for OCEANUS section H

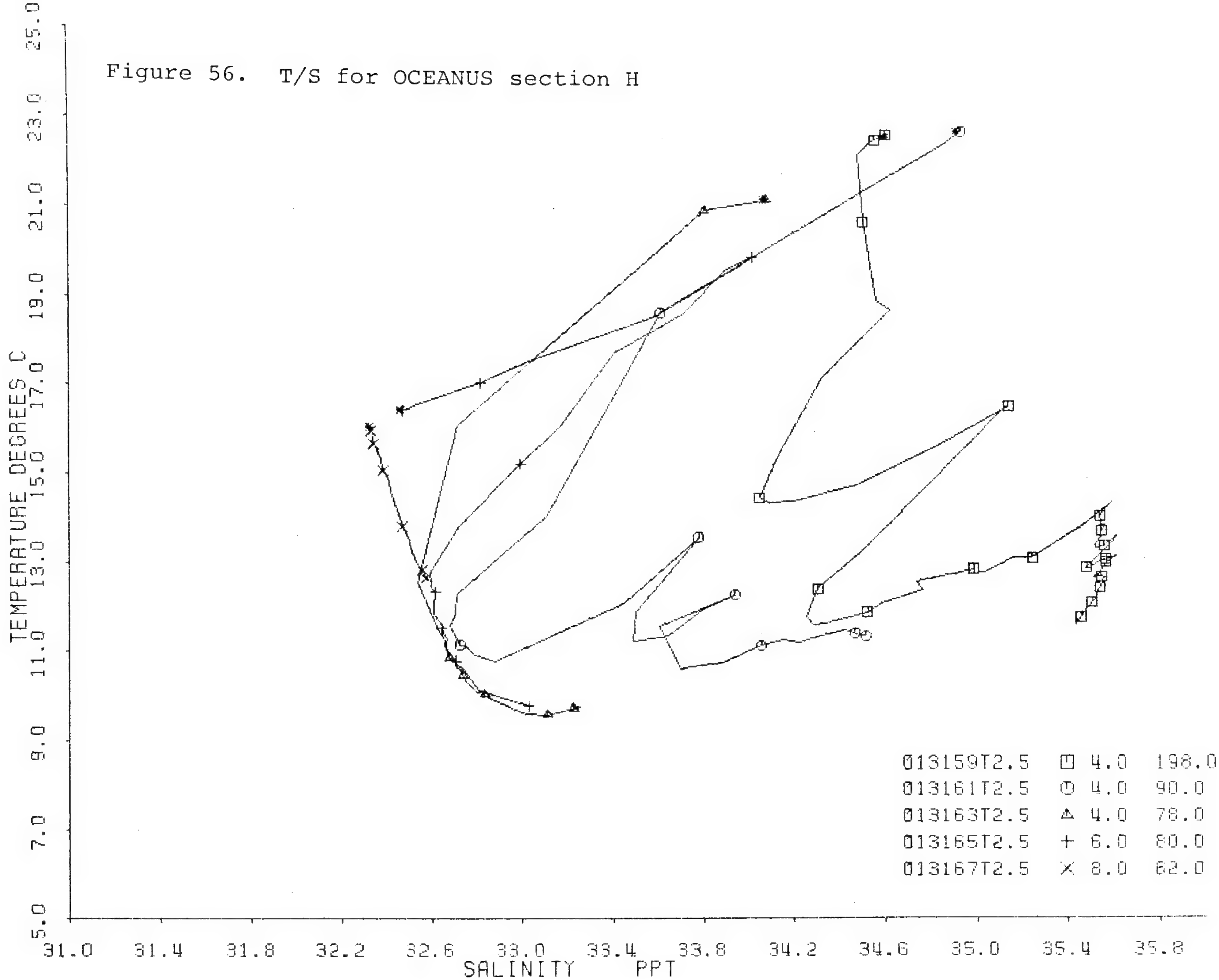


Figure 57. T/S for OCEANUS section I

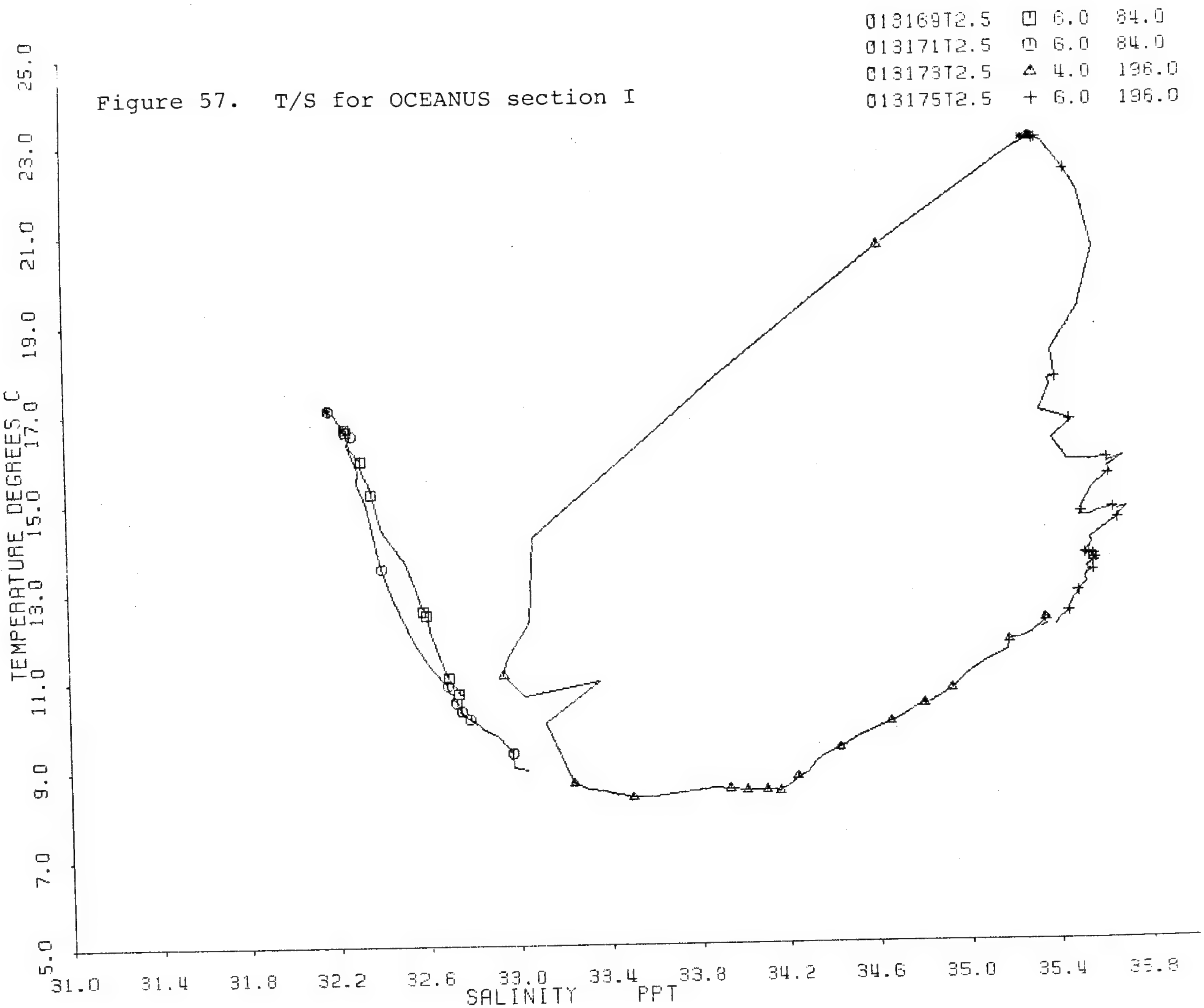


Figure 58. T/S for OCEANUS section J

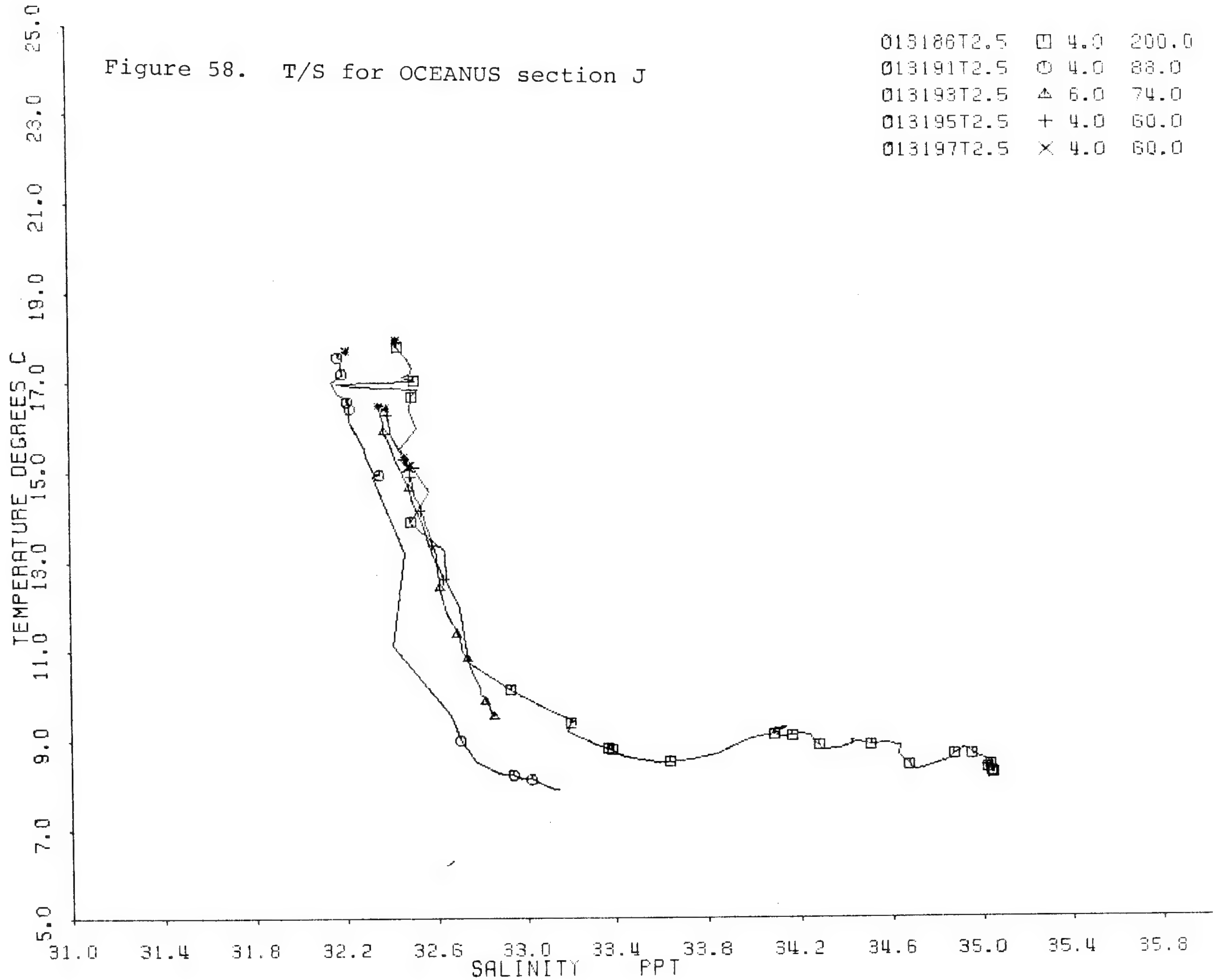
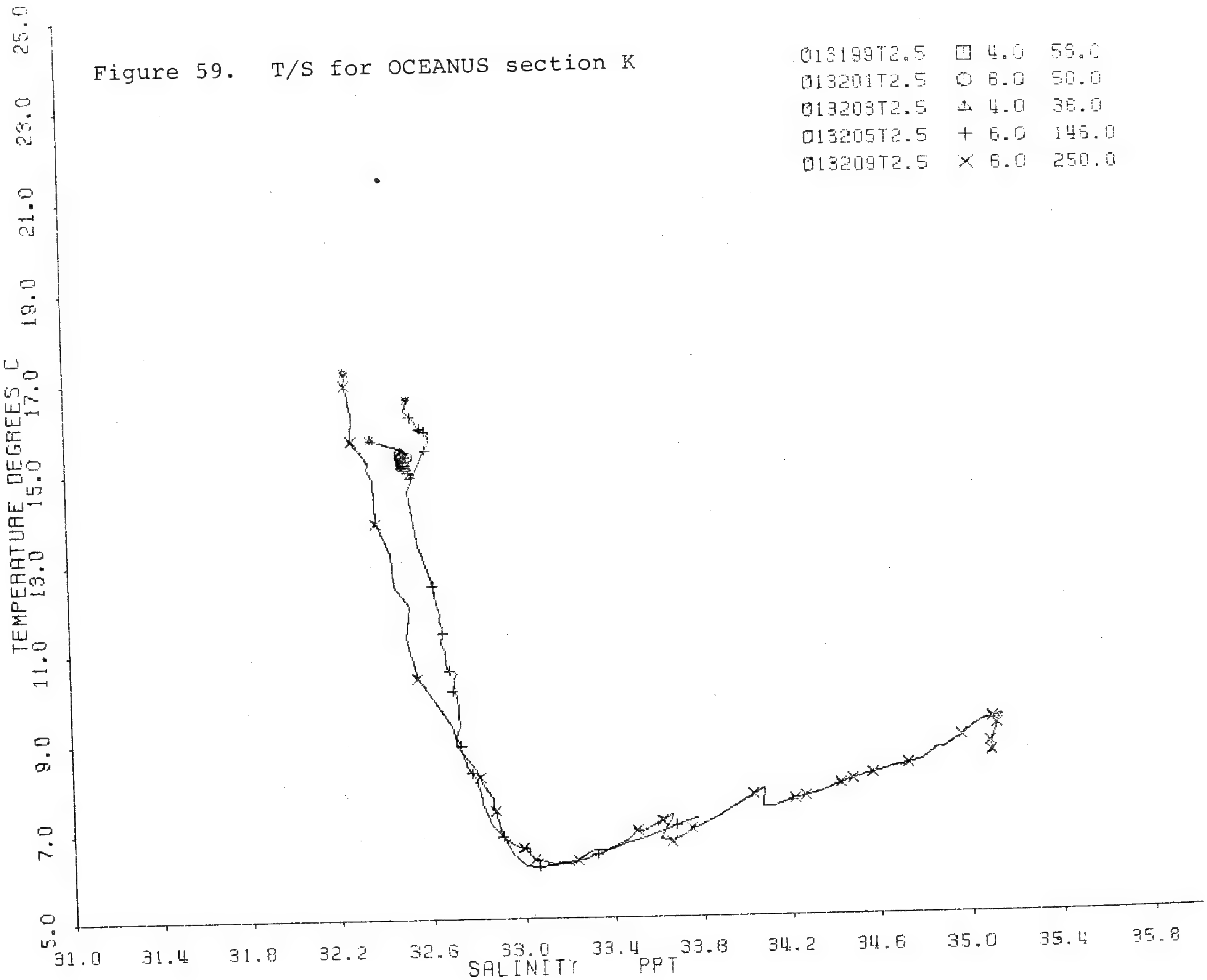


Figure 59. T/S for OCEANUS section K



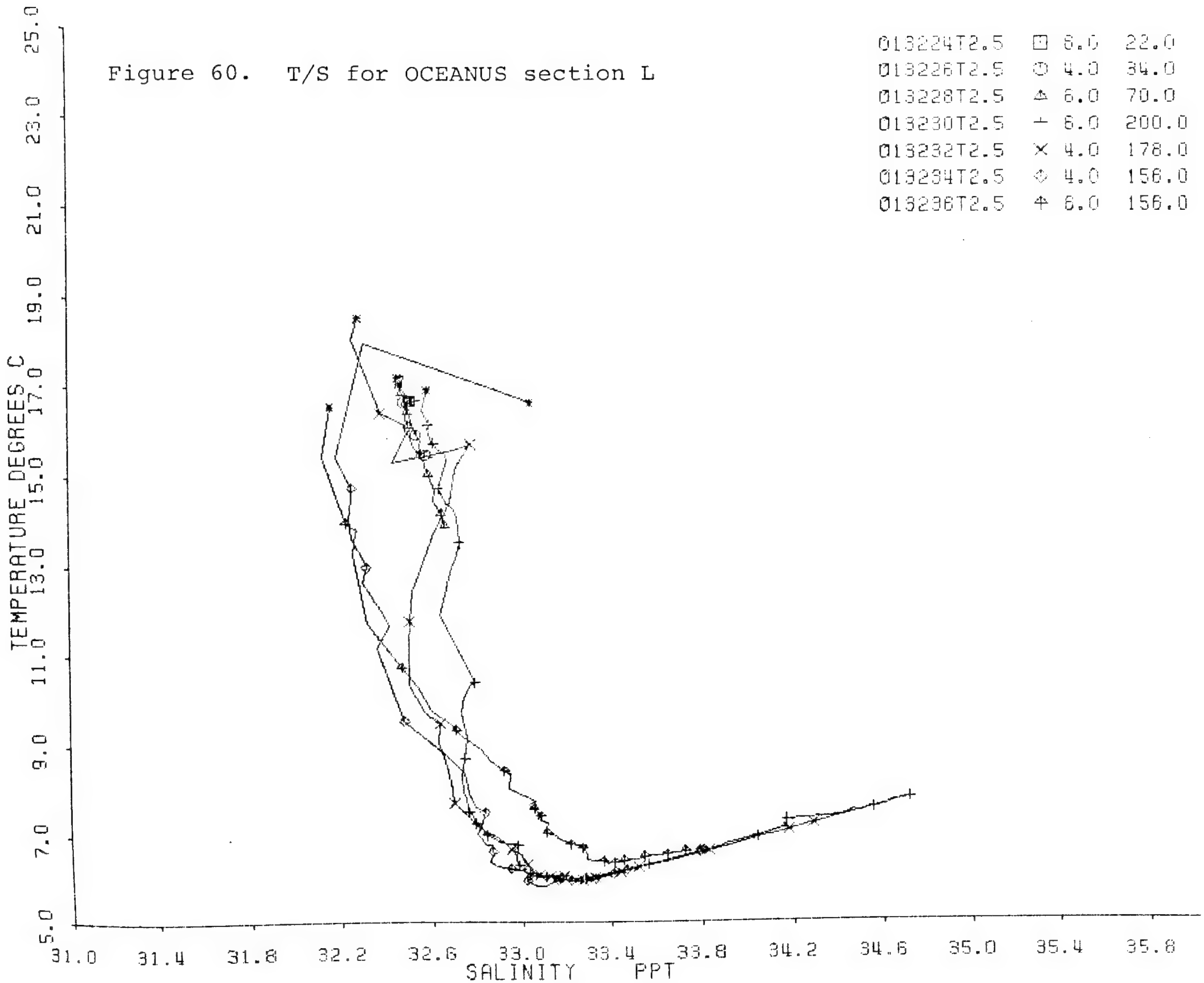
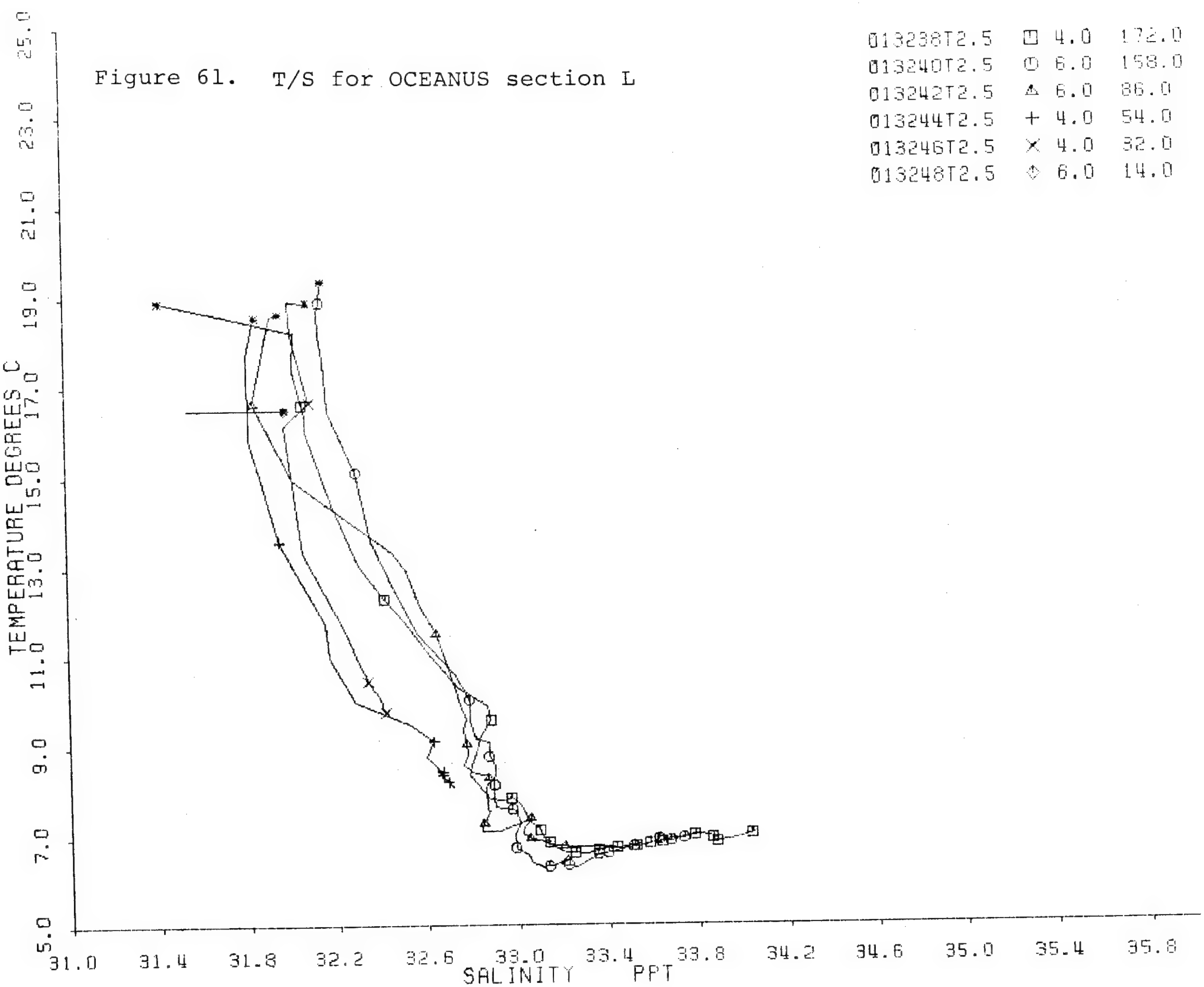


Figure 60. T/S for OCEANUS section L

Figure 61. T/S for OCEANUS section L



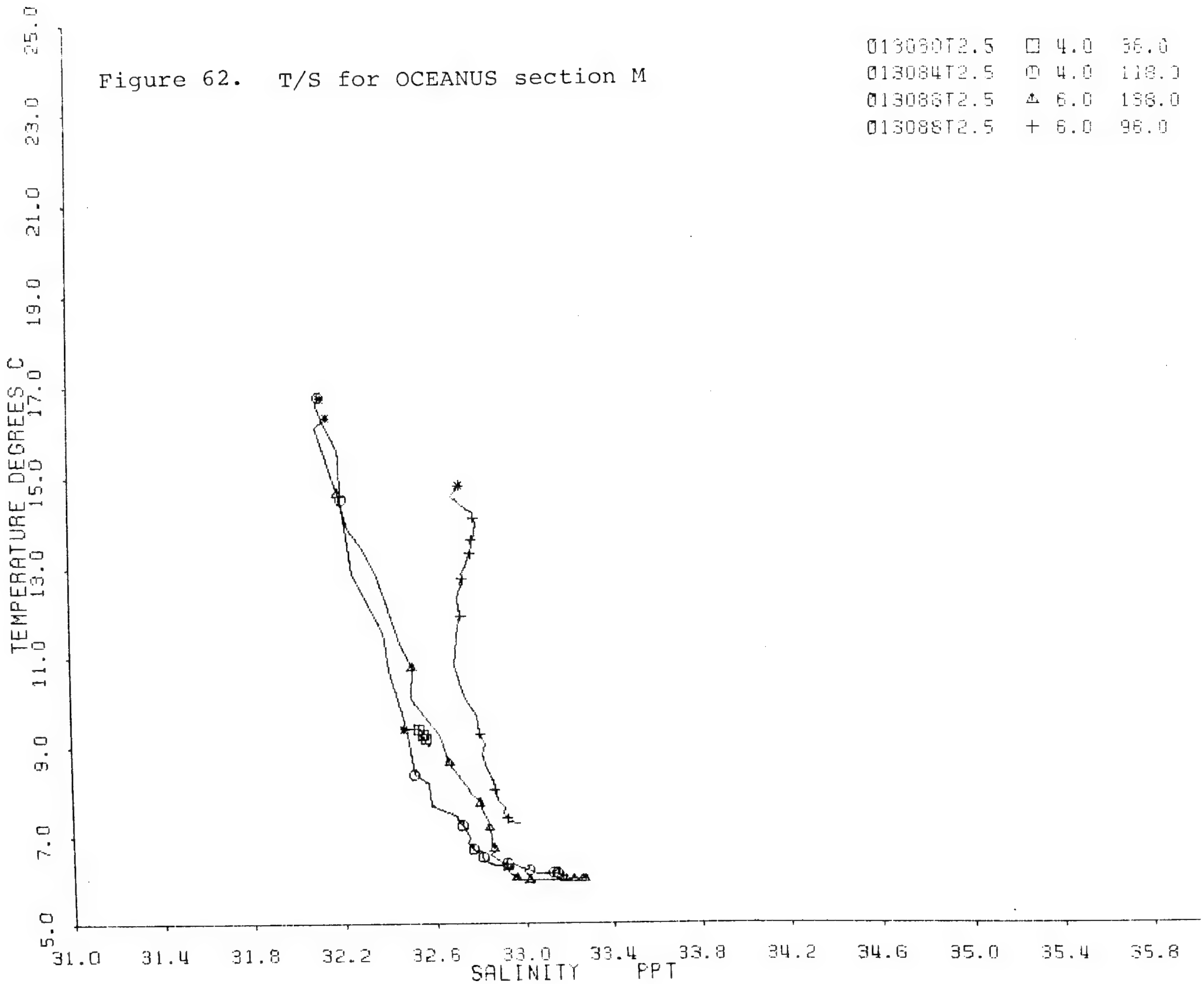


Figure 62. T/S for OCEANUS section M

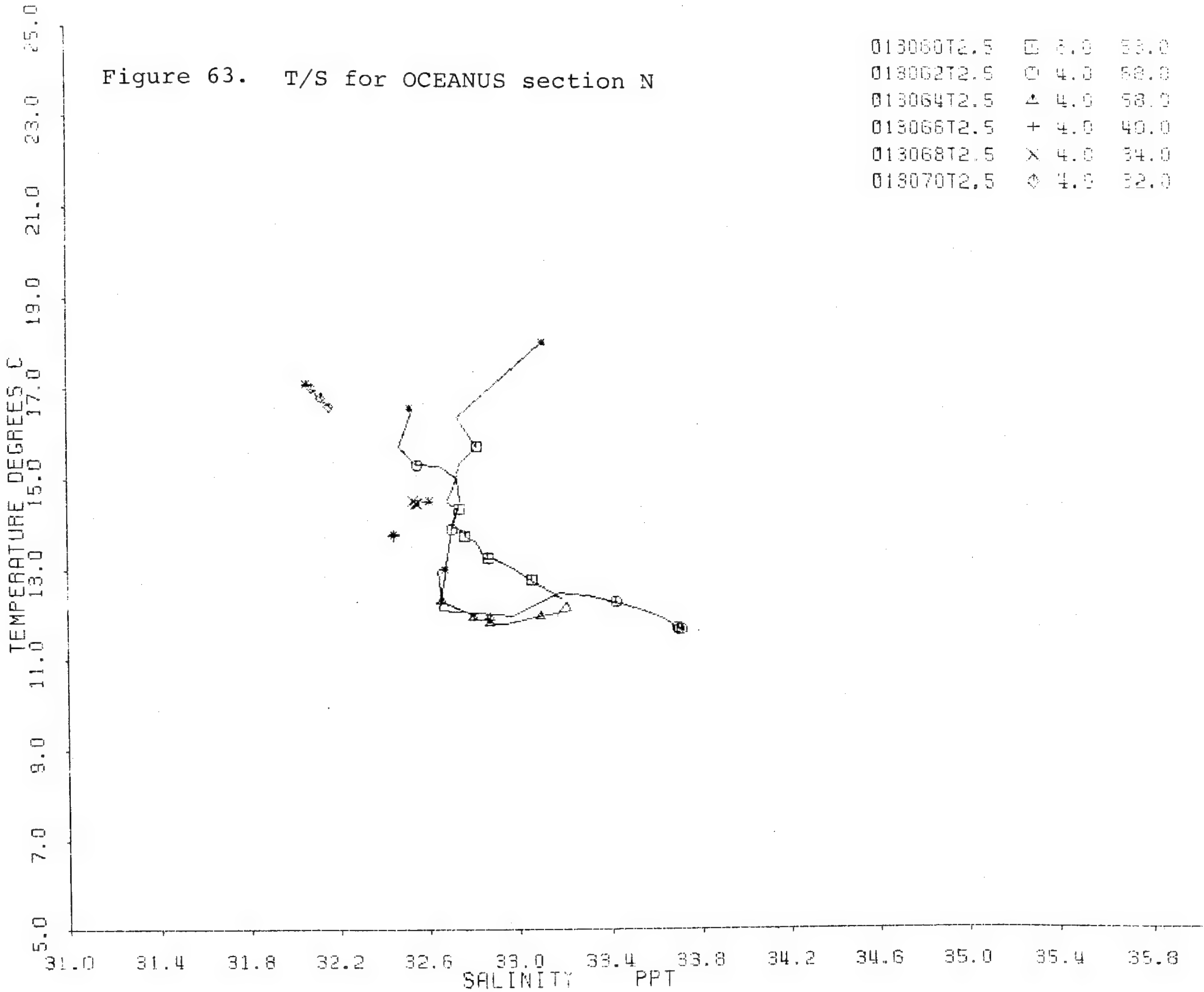


Figure 63. T/S for OCEANUS section N

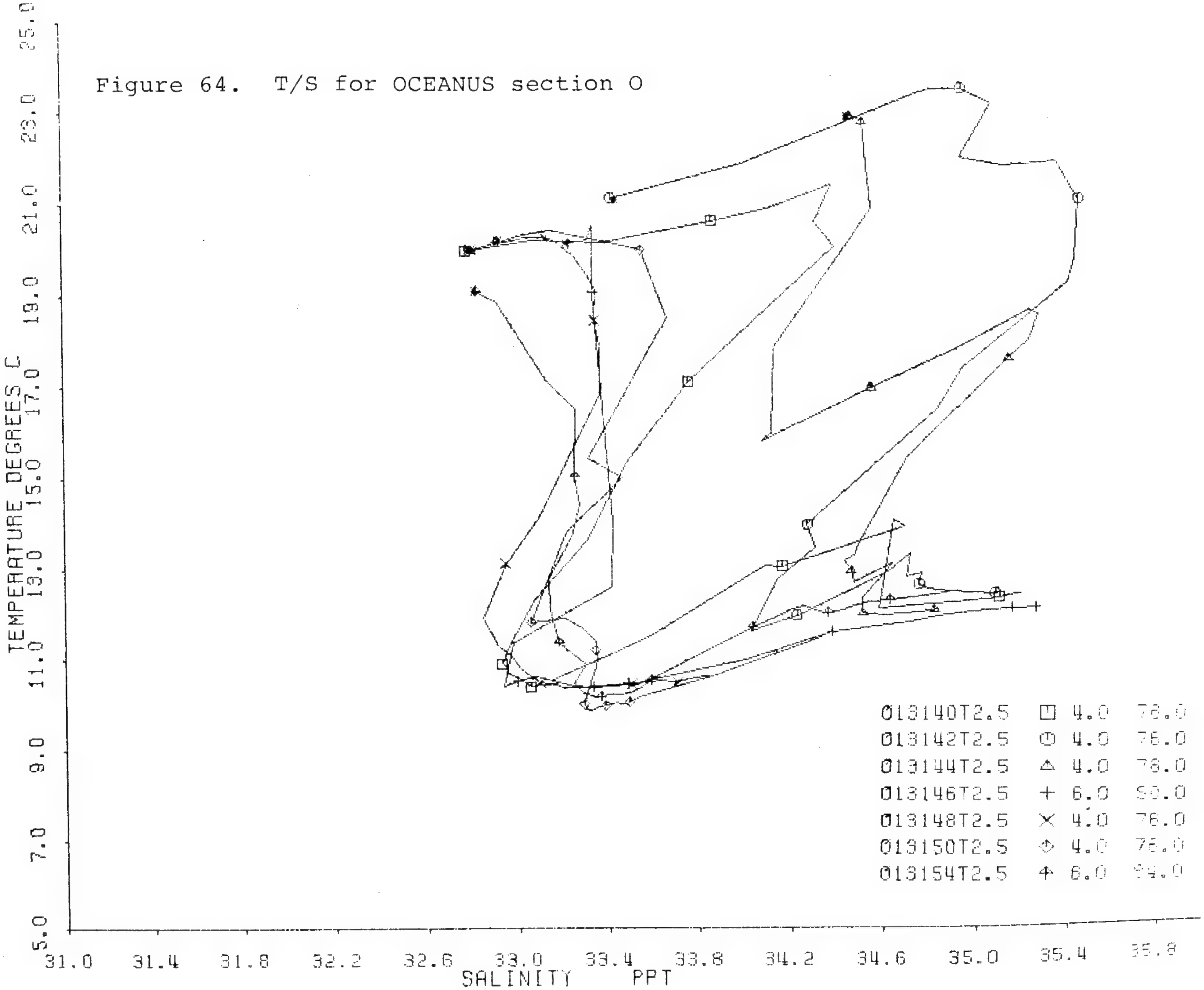


Figure 64. T/S for OCEANUS section O

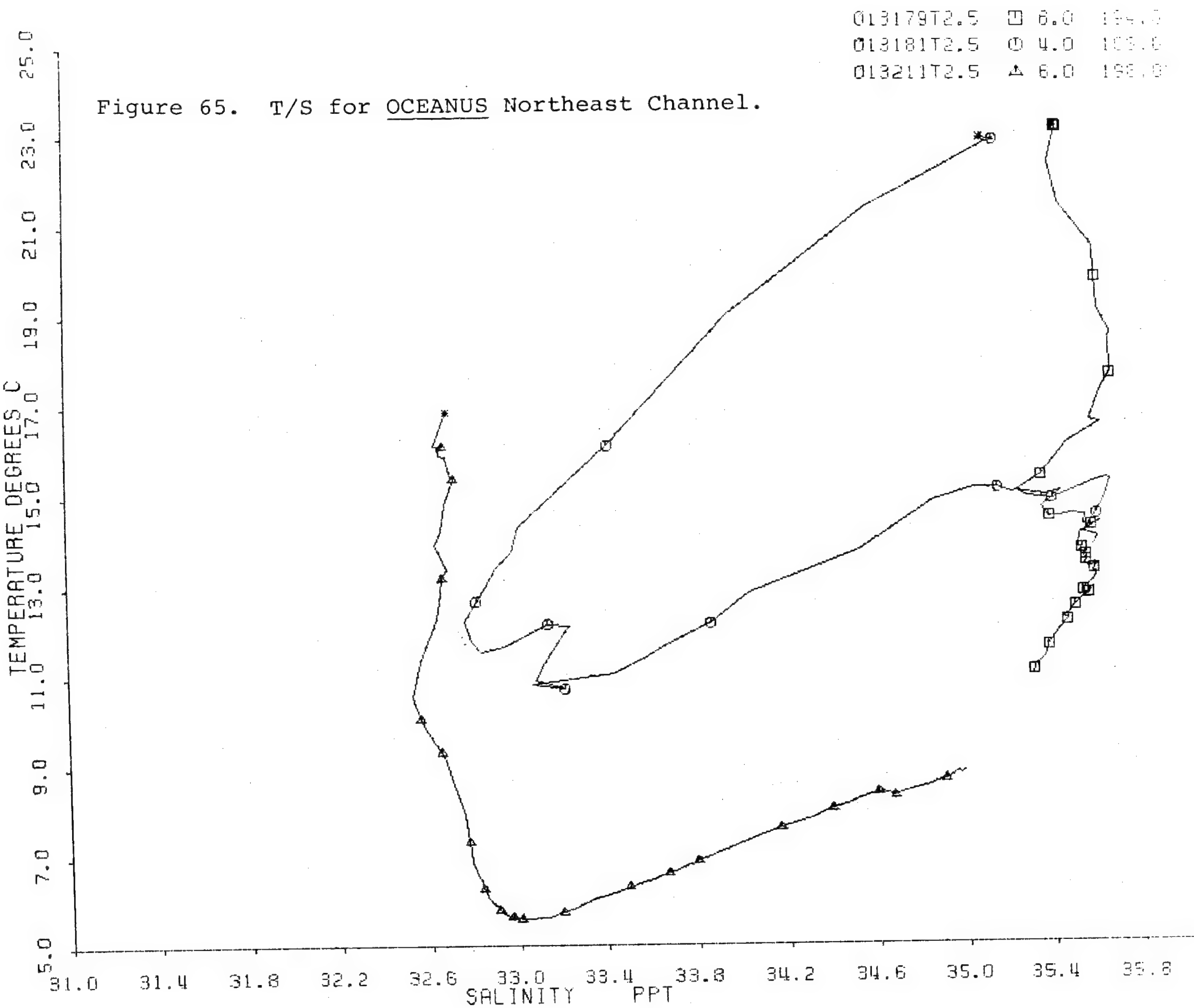


Figure 65. T/S for <u>OCEANUS</u> Northeast Channel.

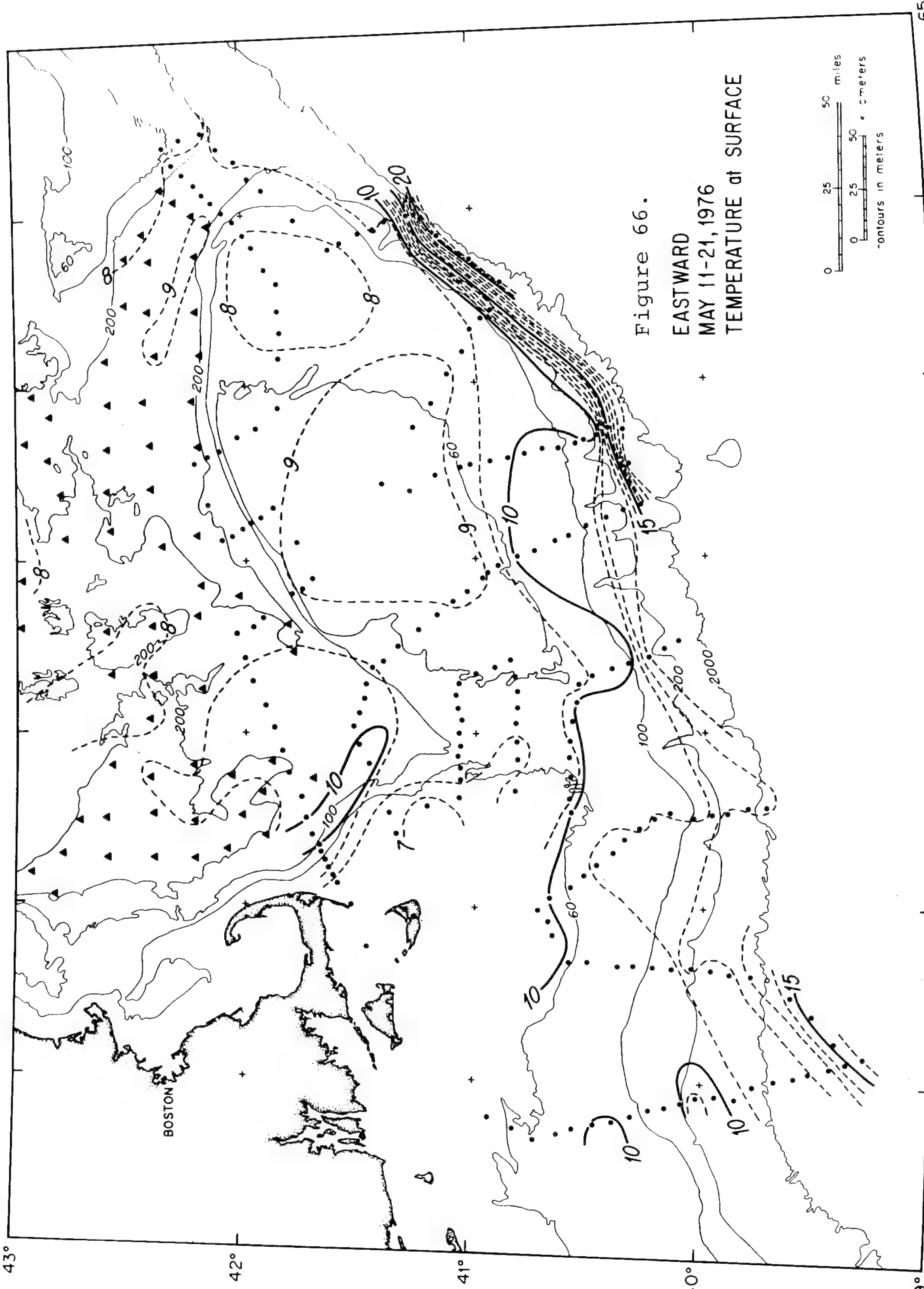


Figure 66.
EASTWARD
MAY 11-21,1976
TEMPERATURE at SURFACE

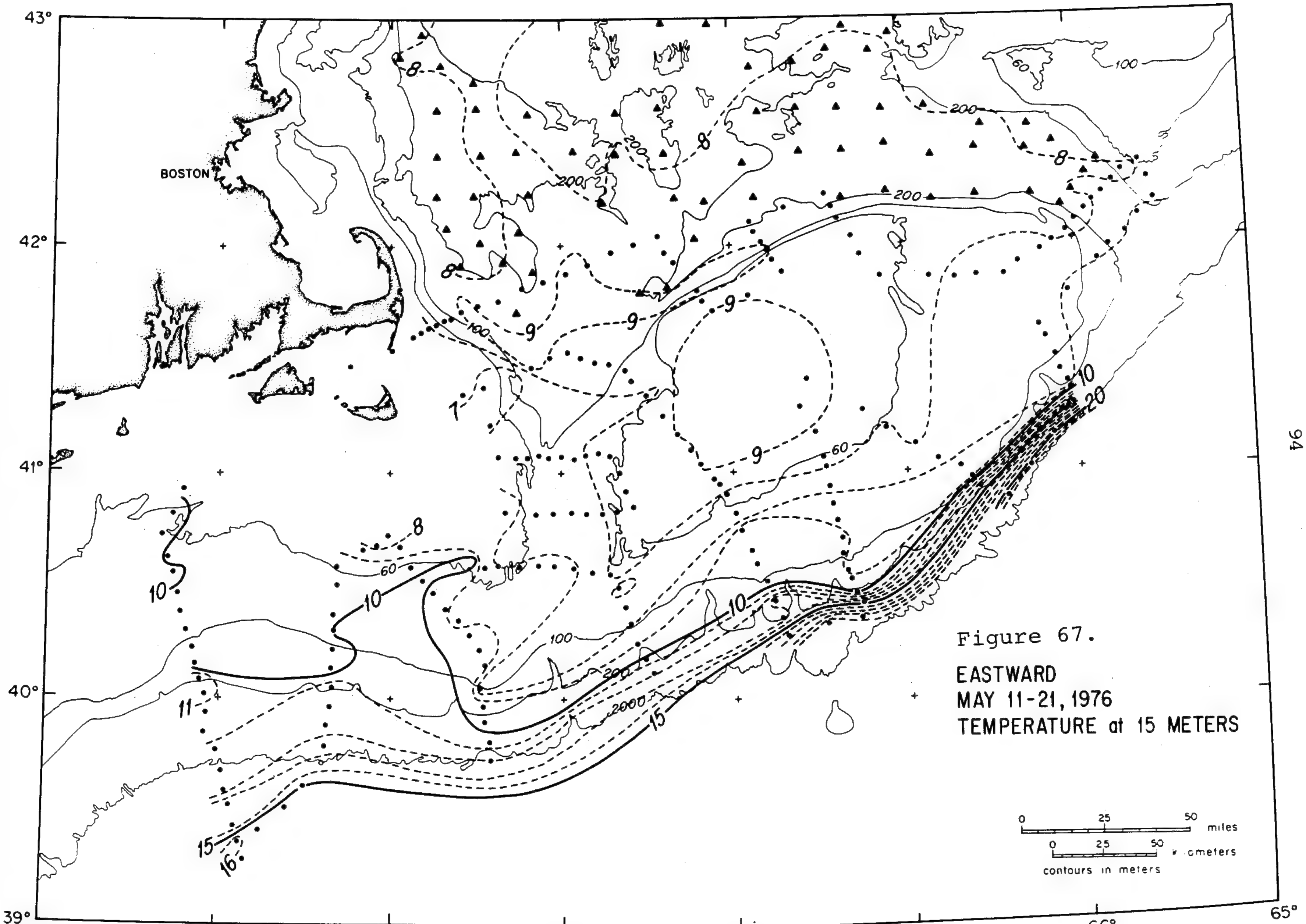


Figure 67.

EASTWARD
MAY 11-21, 1976
TEMPERATURE at 15 METERS

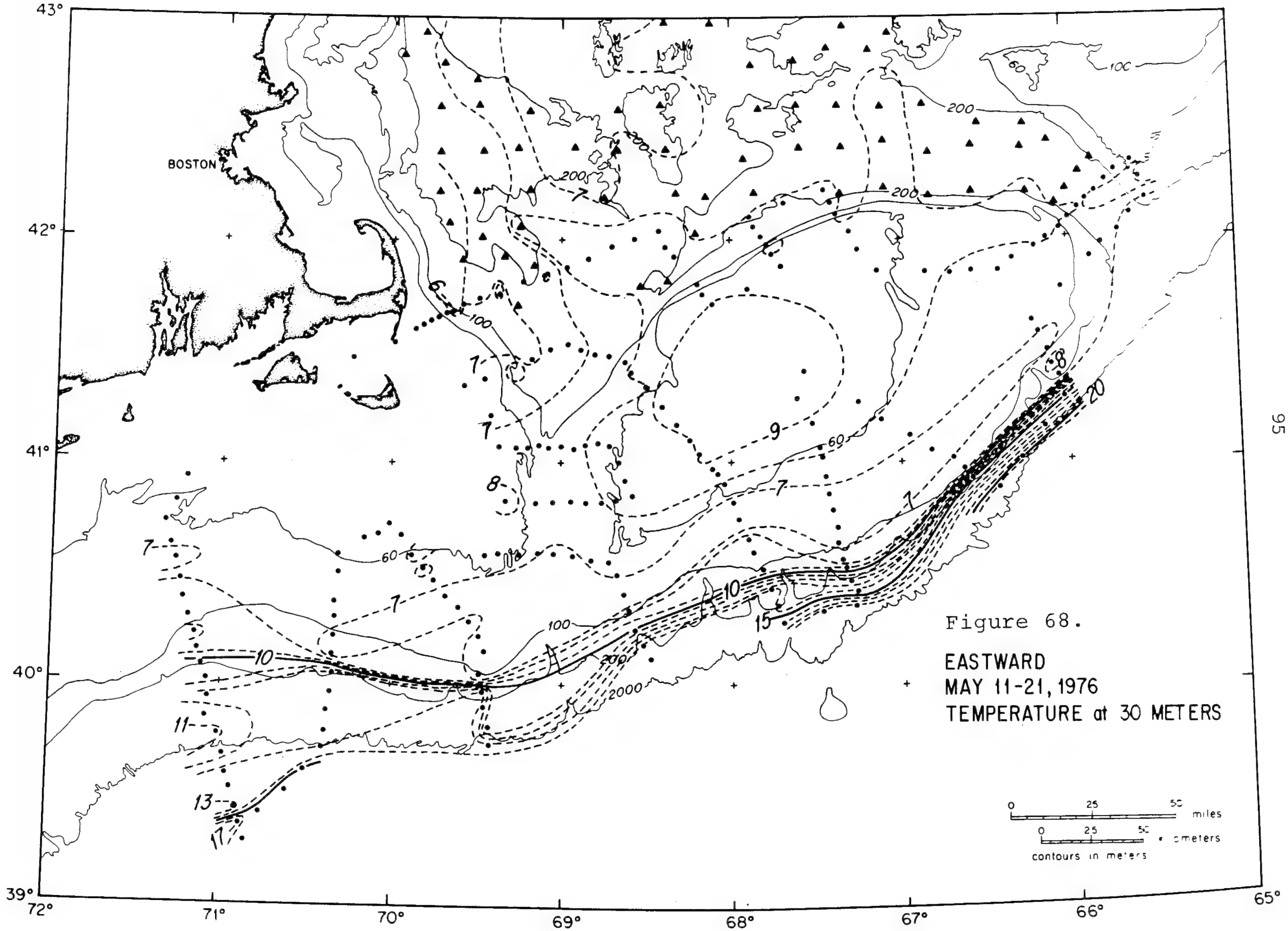


Figure 68.

EASTWARD
MAY 11-21, 1976
TEMPERATURE at 30 METERS

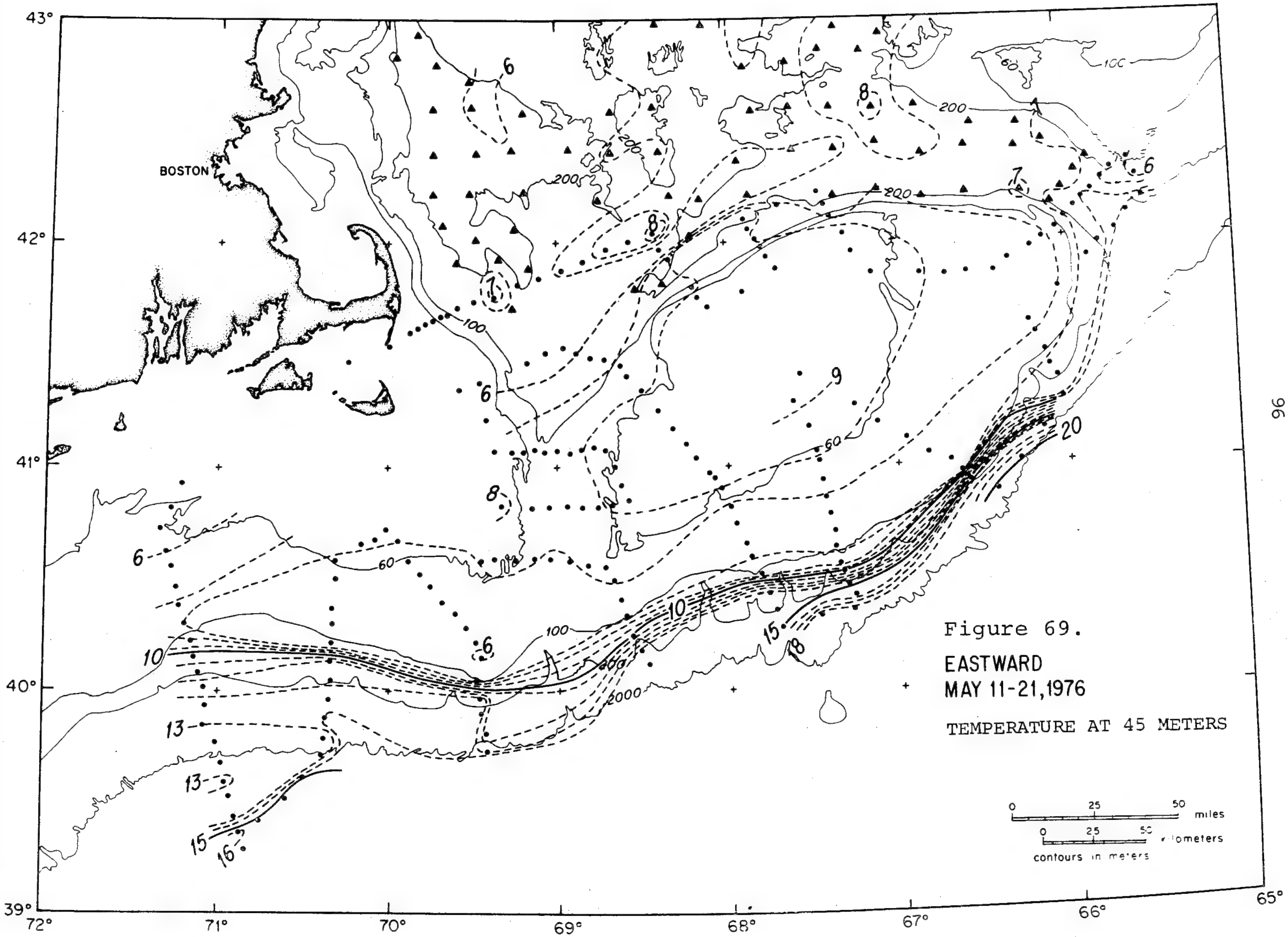


Figure 69.
EASTWARD
MAY 11-21,1976
TEMPERATURE AT 45 METERS

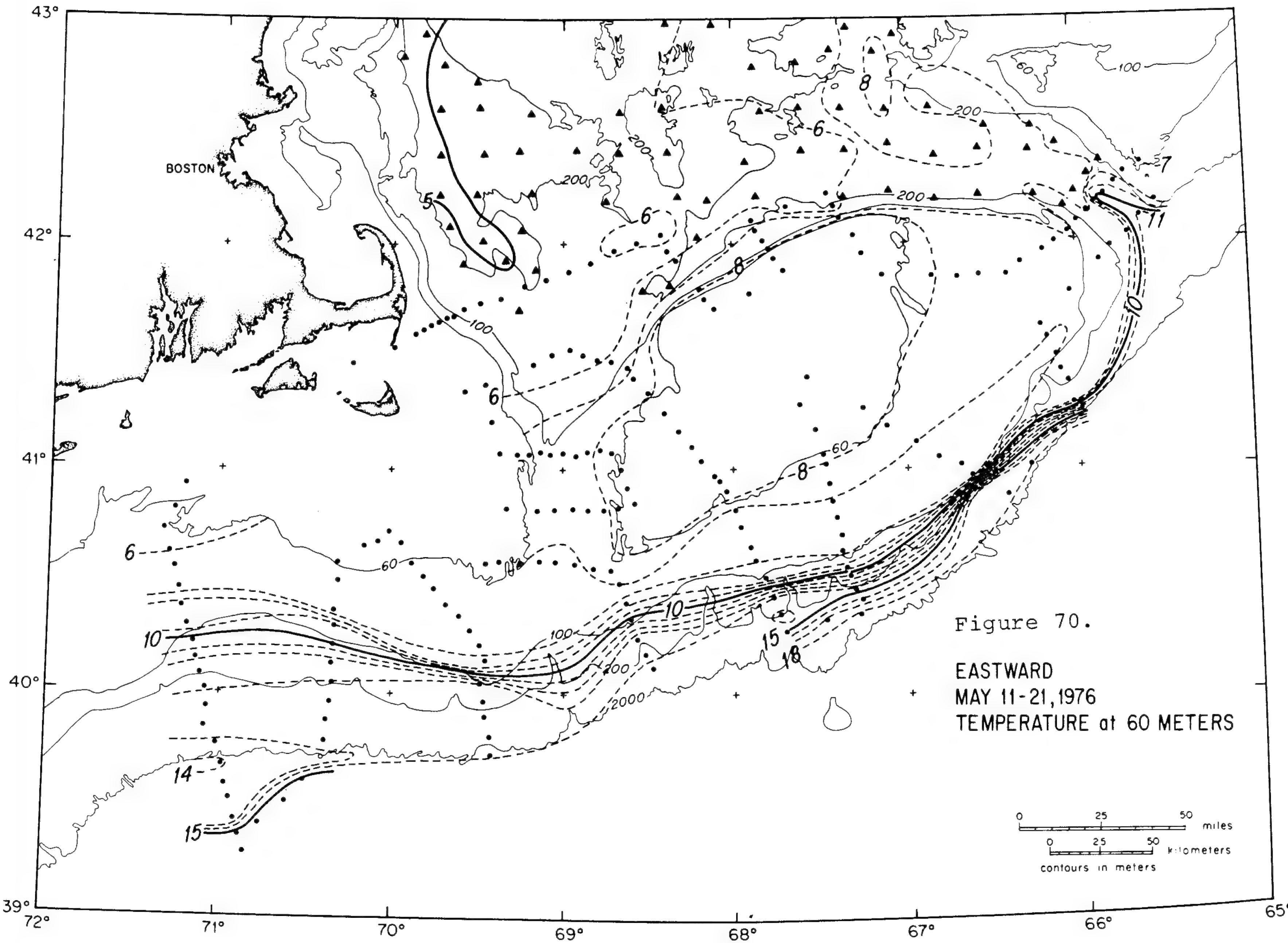


Figure 70.

EASTWARD
MAY 11-21, 1976
TEMPERATURE at 60 METERS

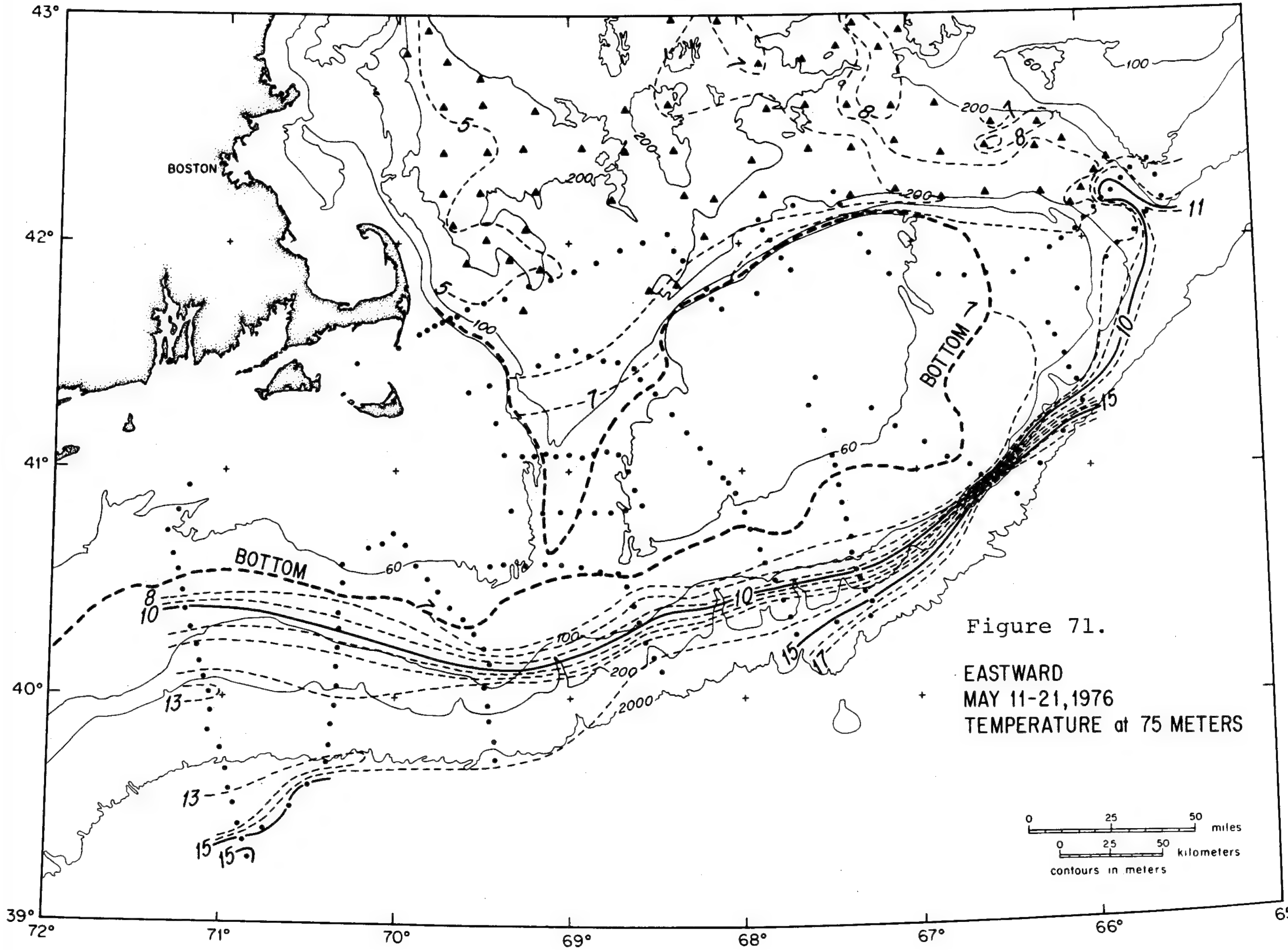


Figure 71.

EASTWARD
MAY 11-21, 1976
TEMPERATURE at 75 METERS

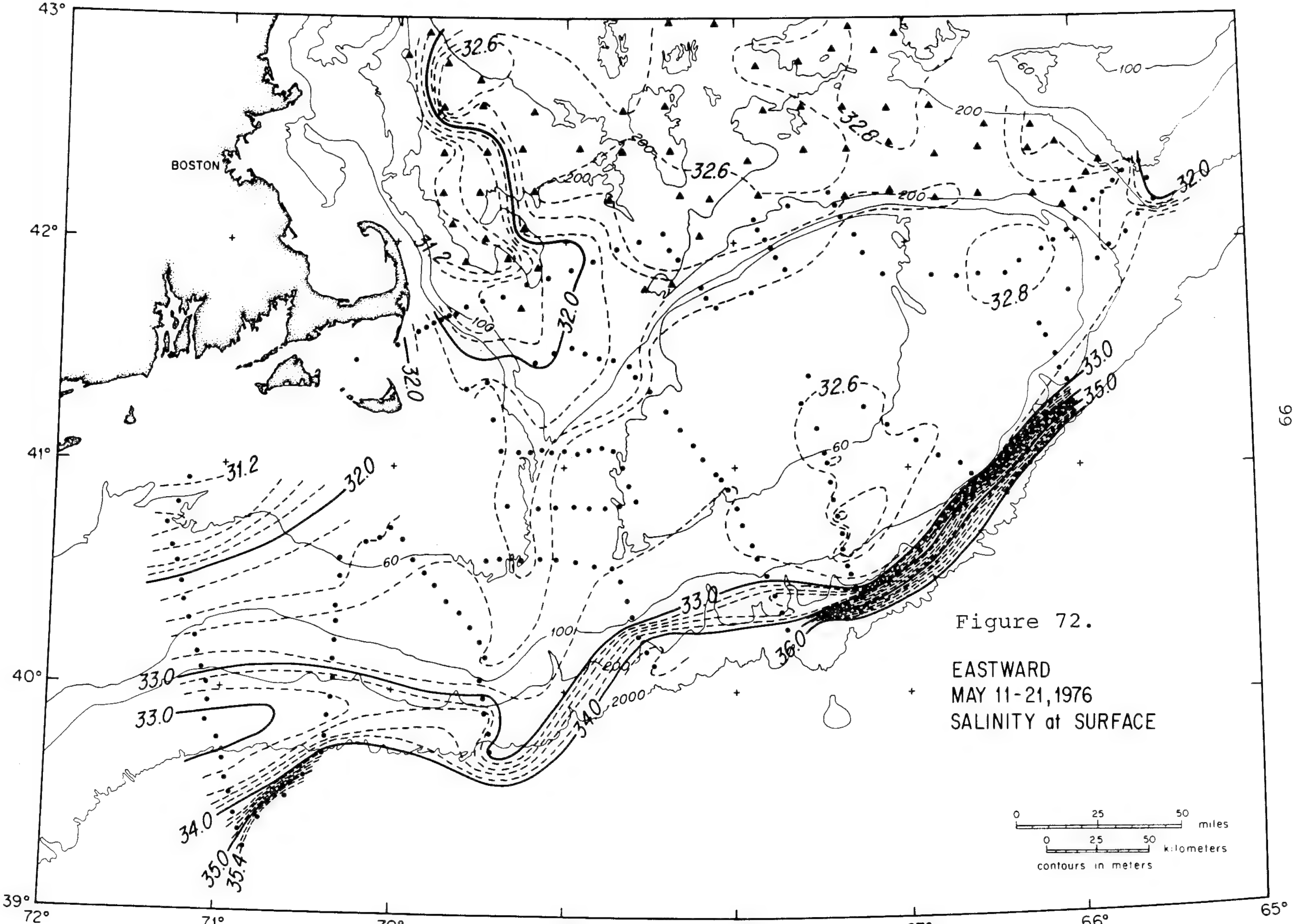


Figure 72.

EASTWARD
MAY 11-21,1976
SALINITY at SURFACE

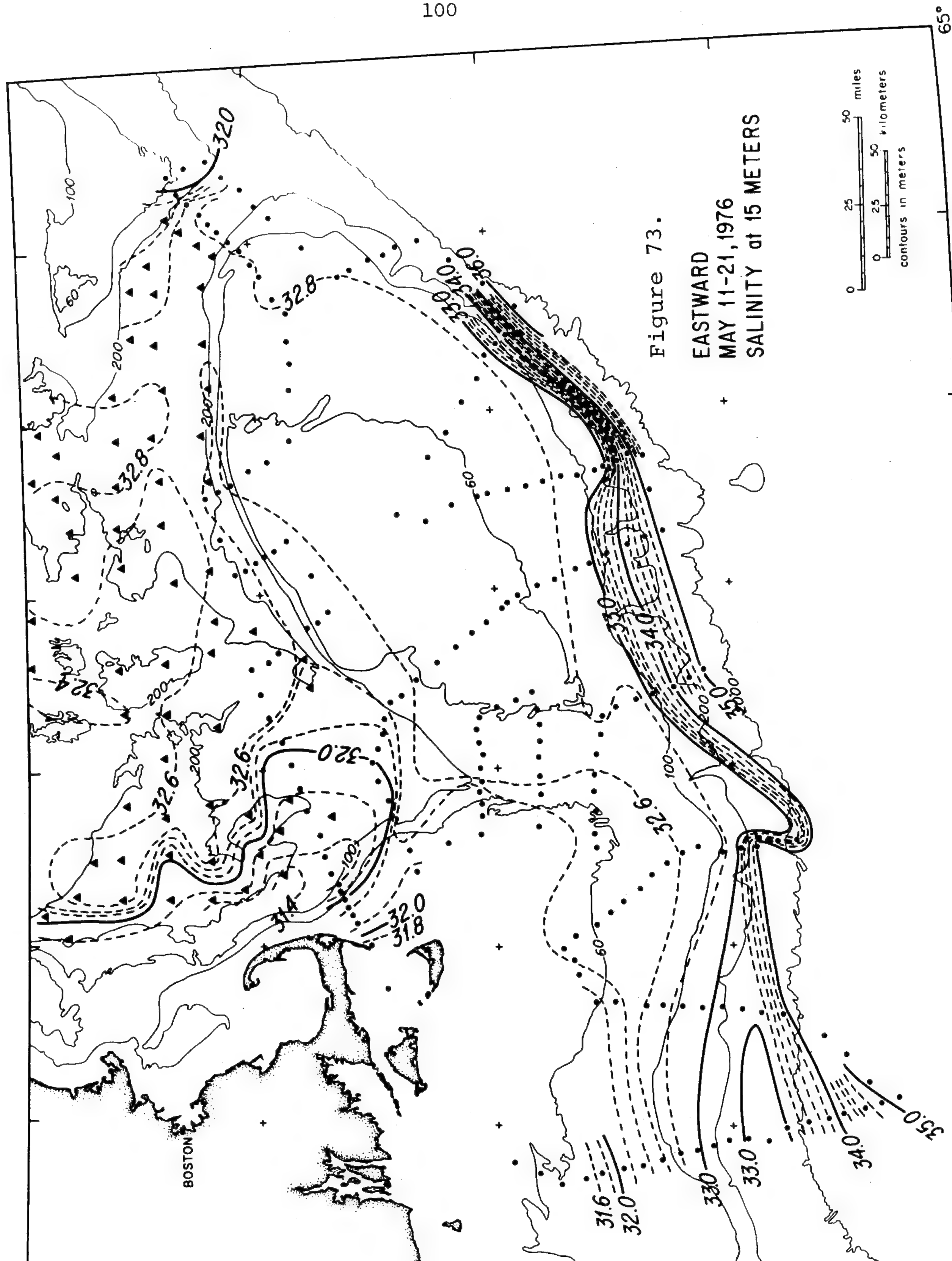


Figure 73.

EASTWARD
MAY 11-21, 1976
SALINITY at 15 METERS

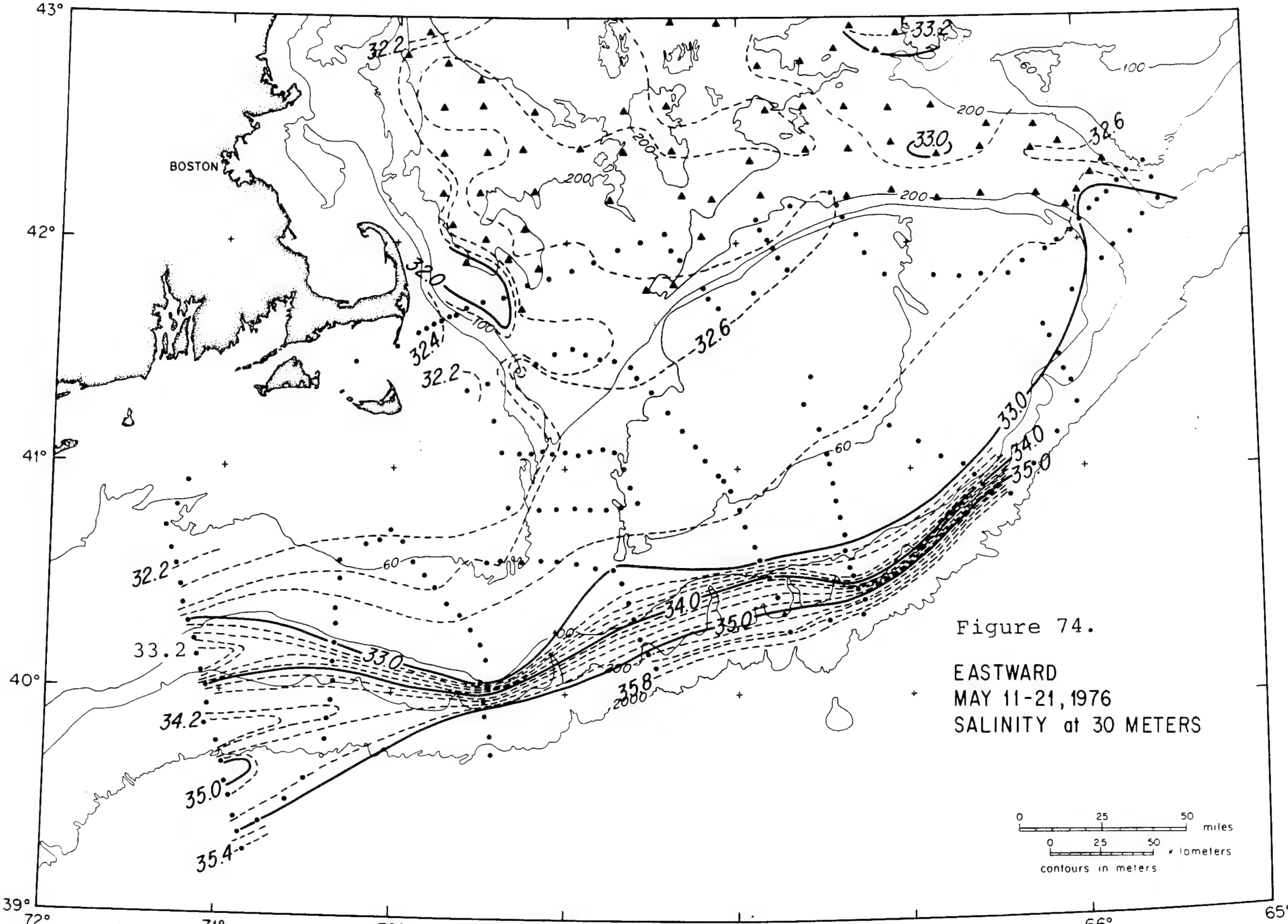


Figure 74.

EASTWARD
MAY 11-21, 1976
SALINITY at 30 METERS

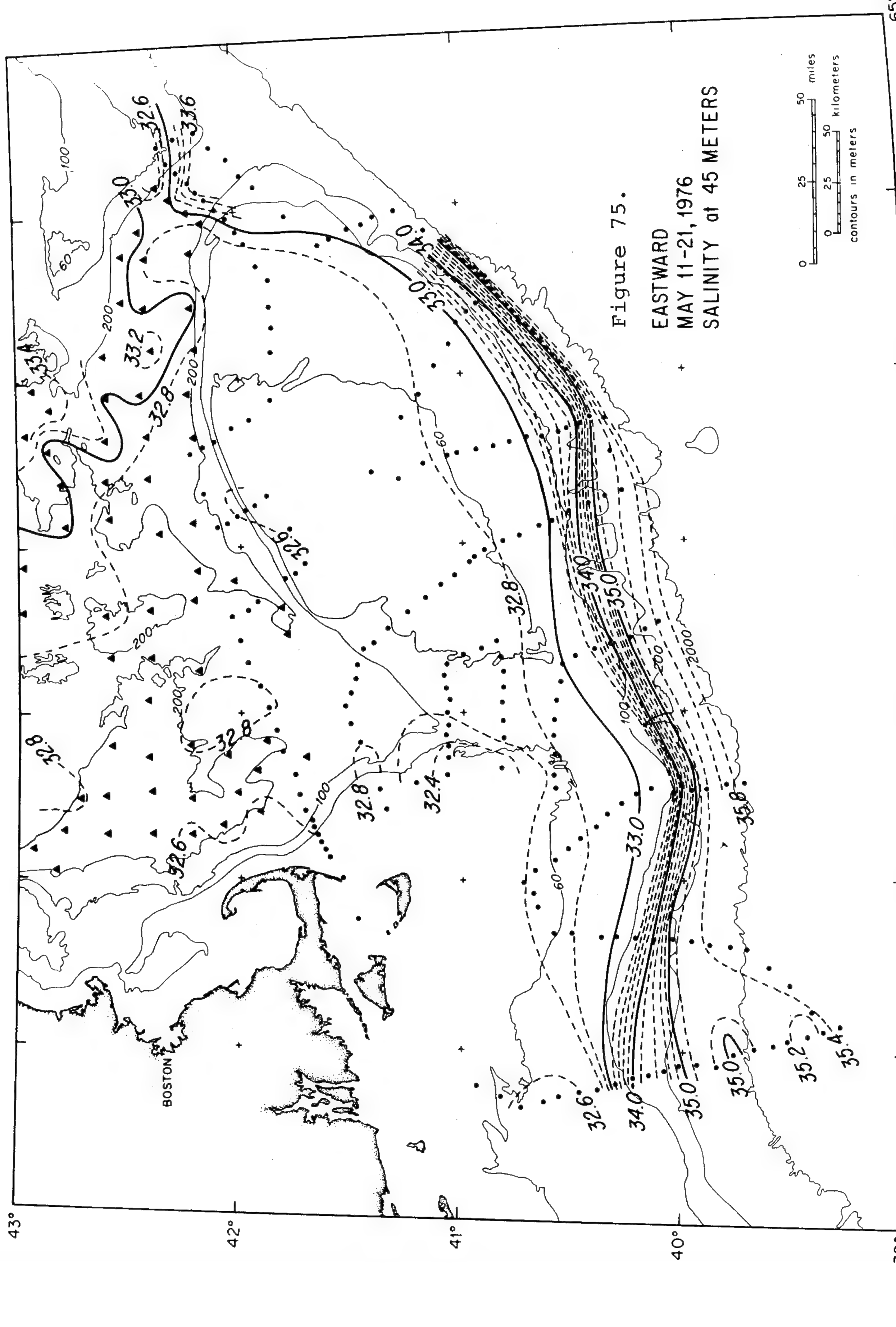


Figure 75.

EASTWARD
MAY 11-21, 1976
SALINITY at 45 METERS

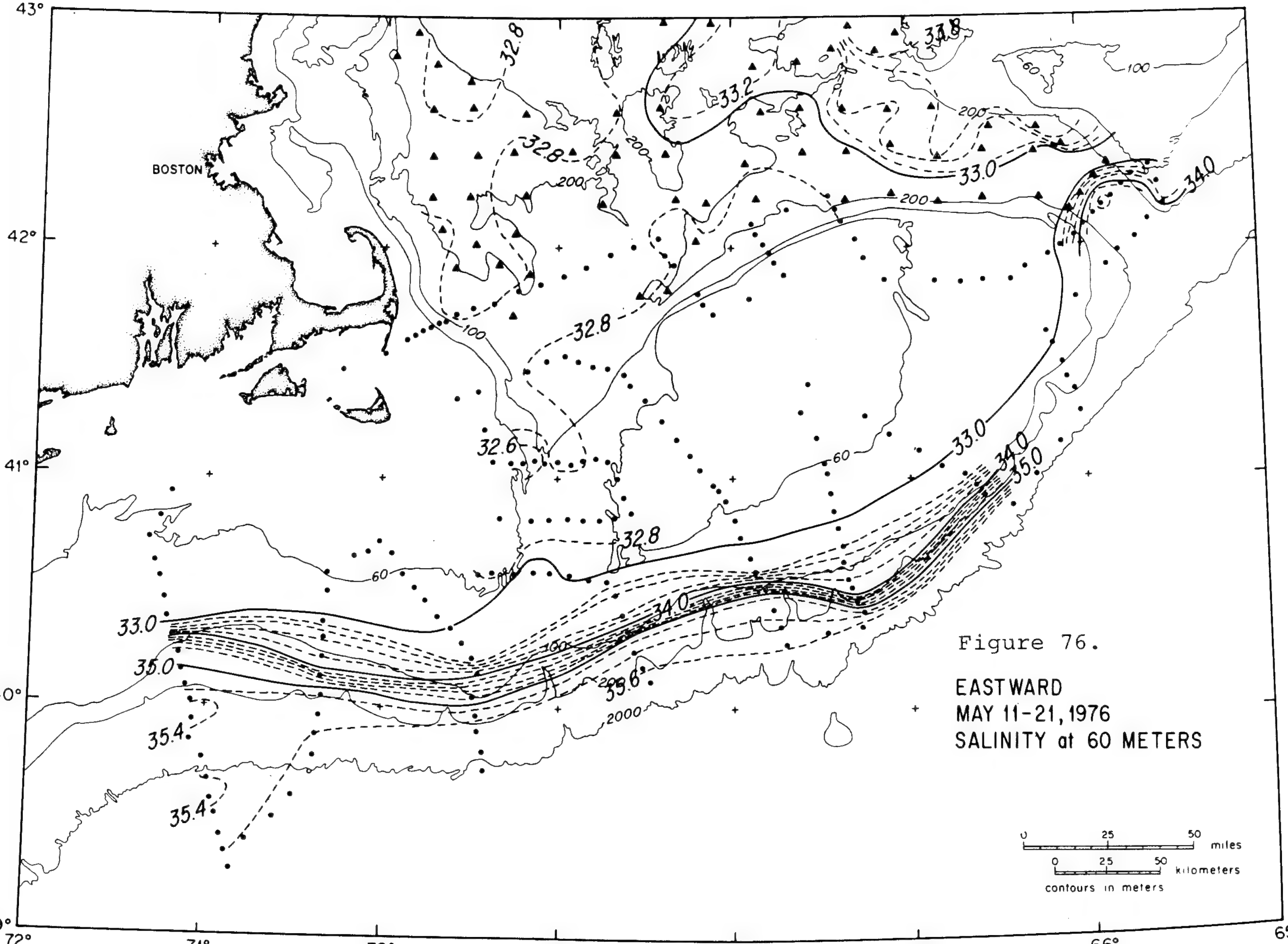


Figure 76.

EASTWARD
MAY 11-21, 1976
SALINITY at 60 METERS

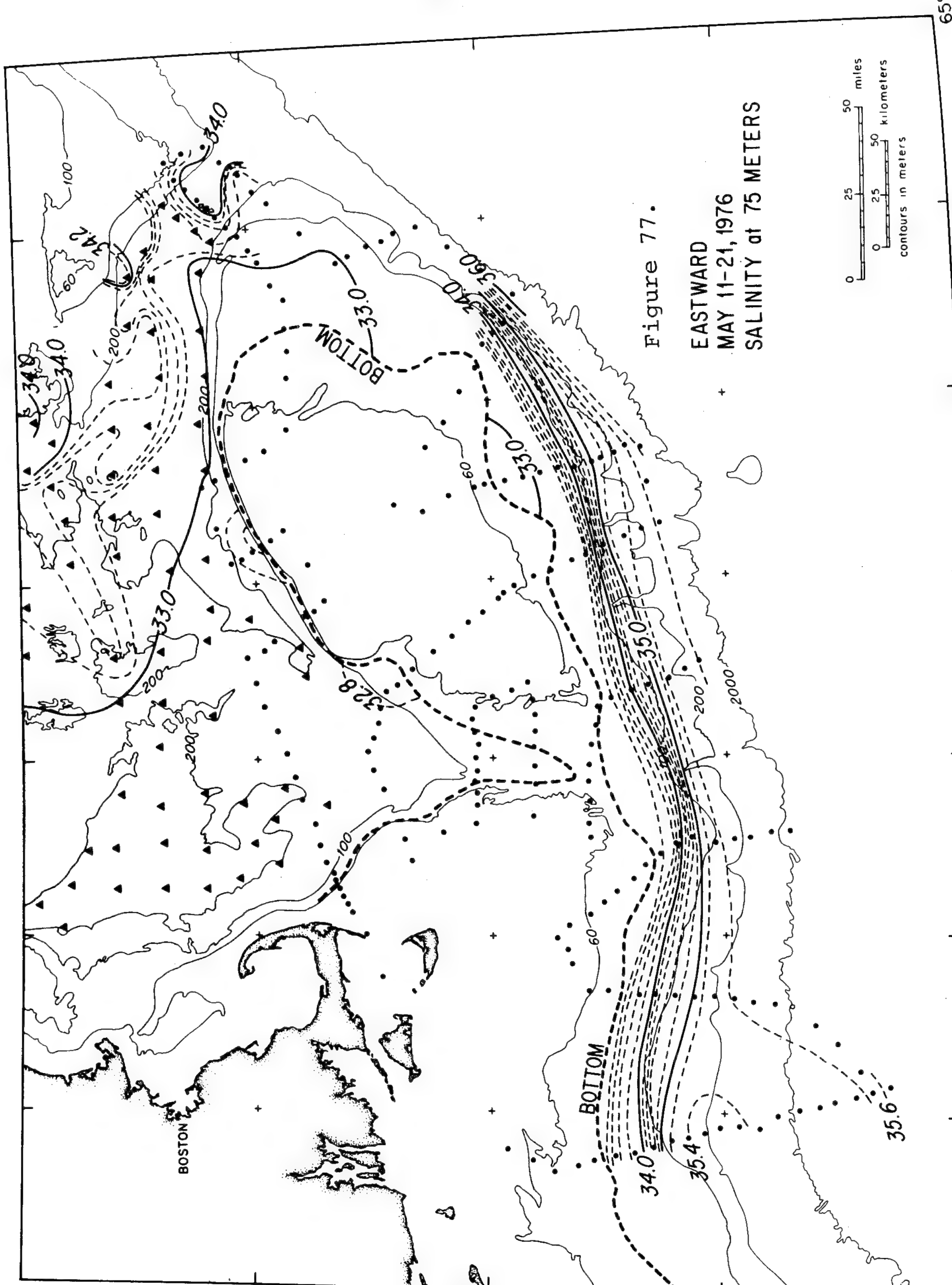


Figure 77.

EASTWARD
MAY 11-21, 1976
SALINITY at 75 METERS

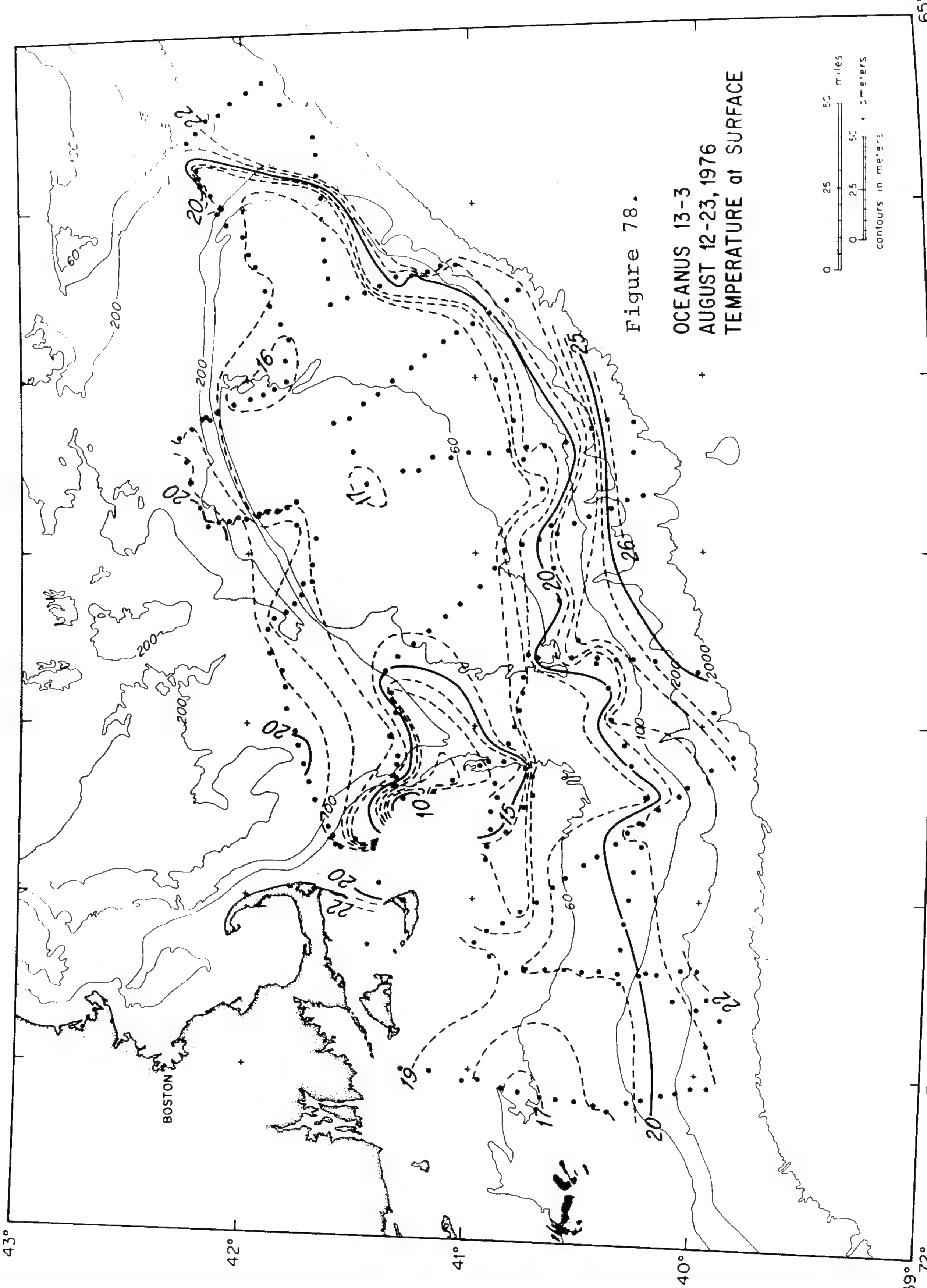


Figure 78.

OCEANUS 13-3
AUGUST 12-23, 1976
TEMPERATURE at SURFACE

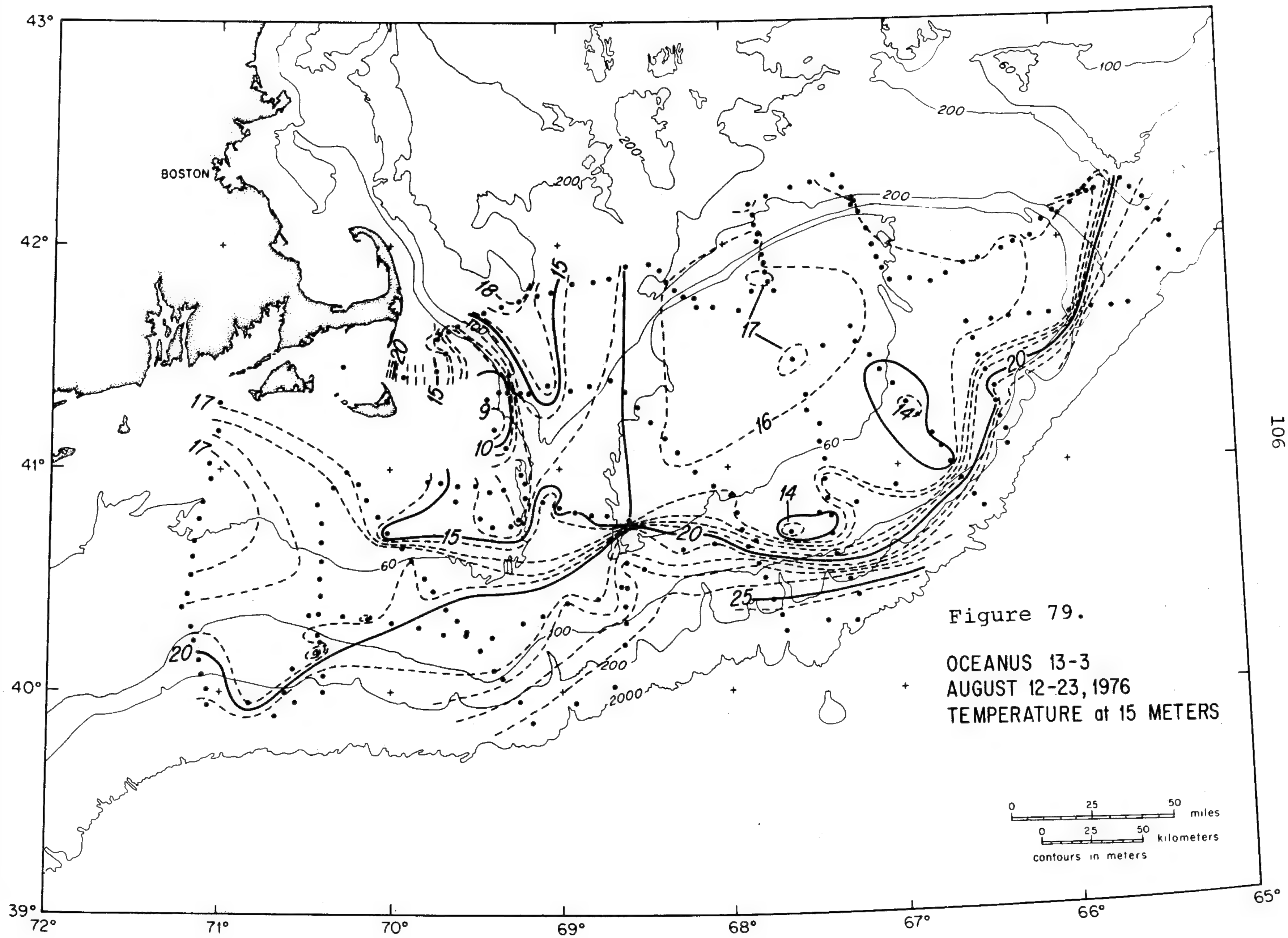


Figure 79.

OCEANUS 13-3
AUGUST 12-23, 1976
TEMPERATURE at 15 METERS

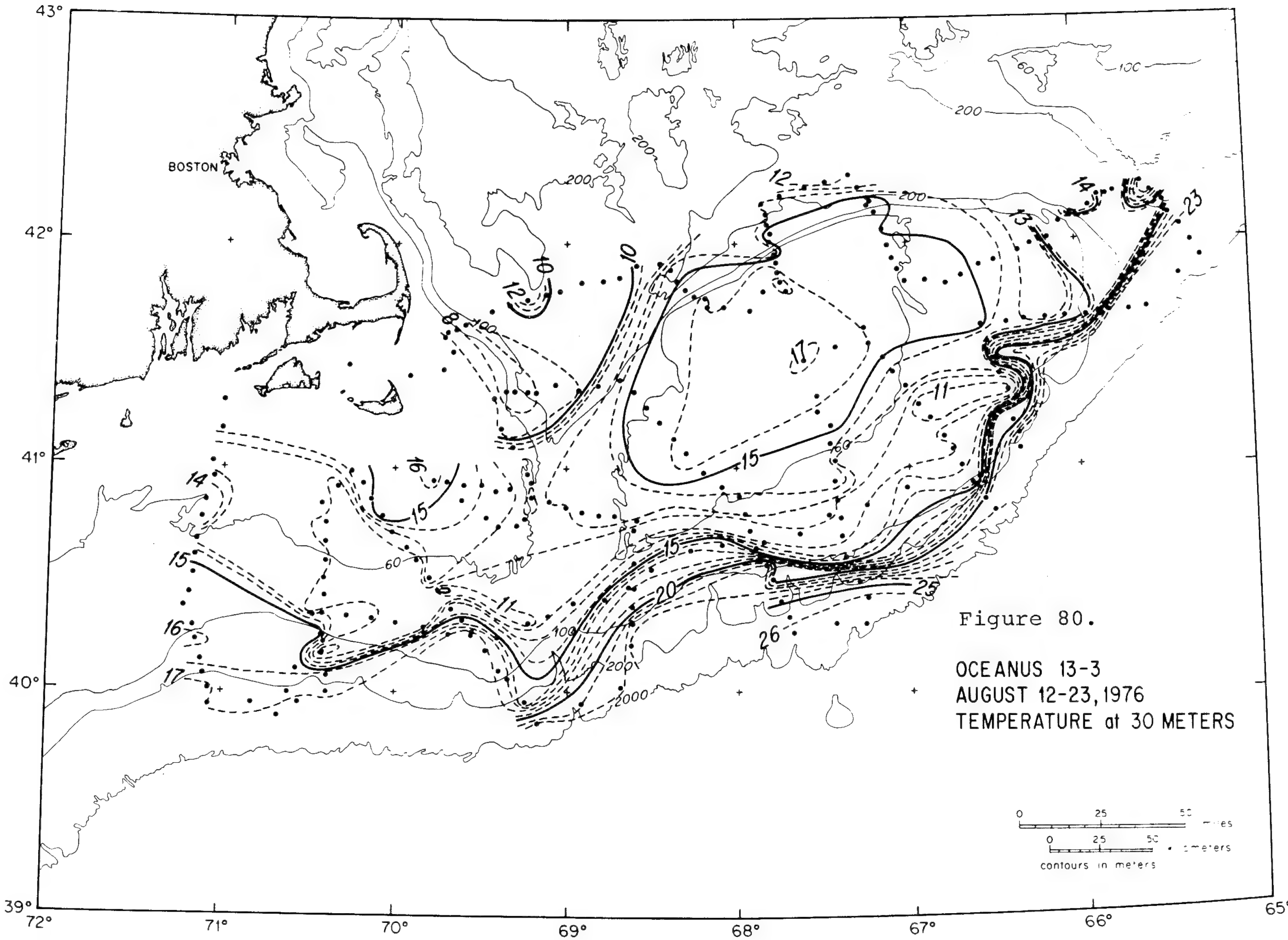


Figure 80.

OCEANUS 13-3
AUGUST 12-23, 1976
TEMPERATURE at 30 METERS

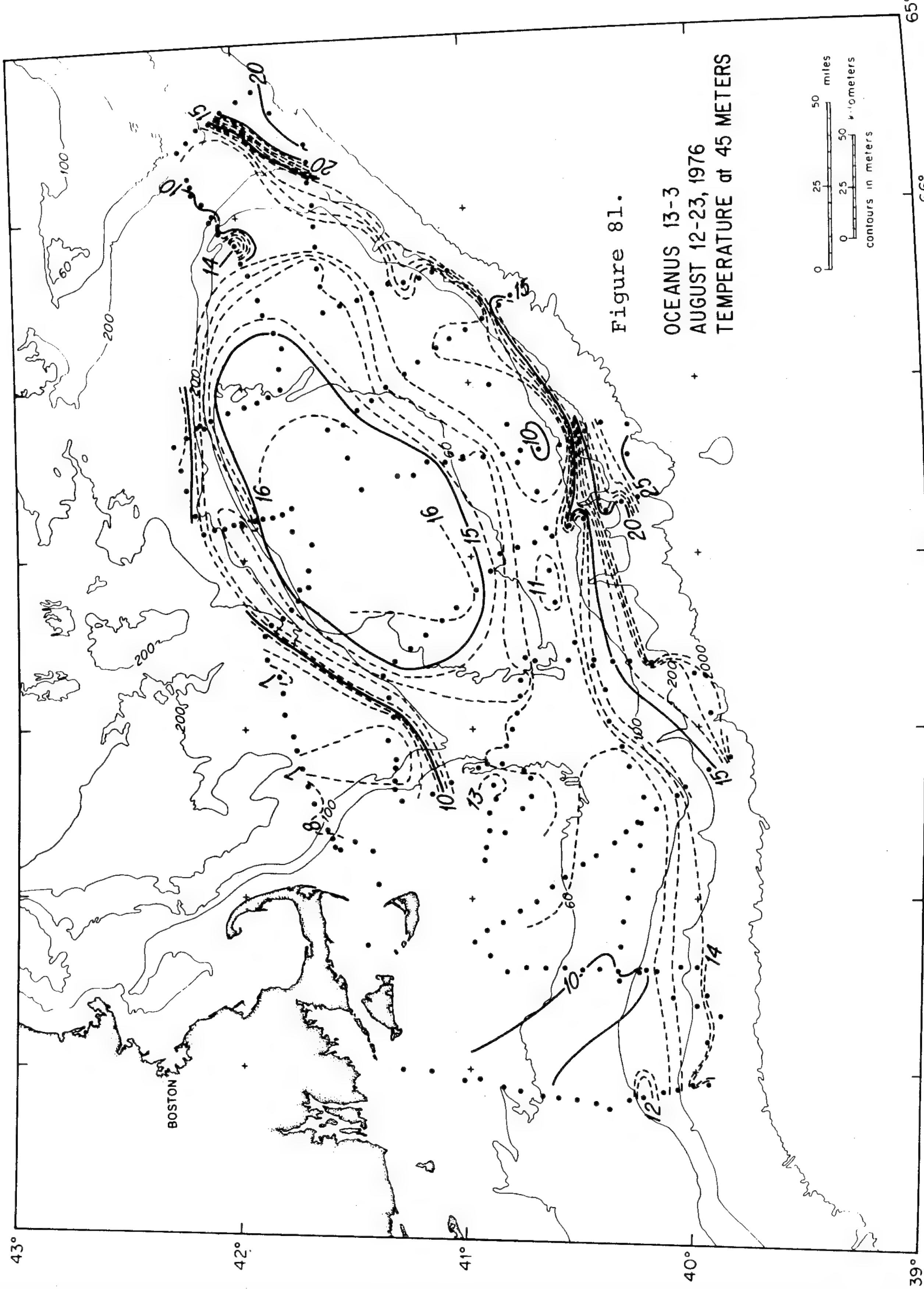


Figure 81.

OCEANUS 13-3
AUGUST 12-23, 1976
TEMPERATURE at 45 METERS

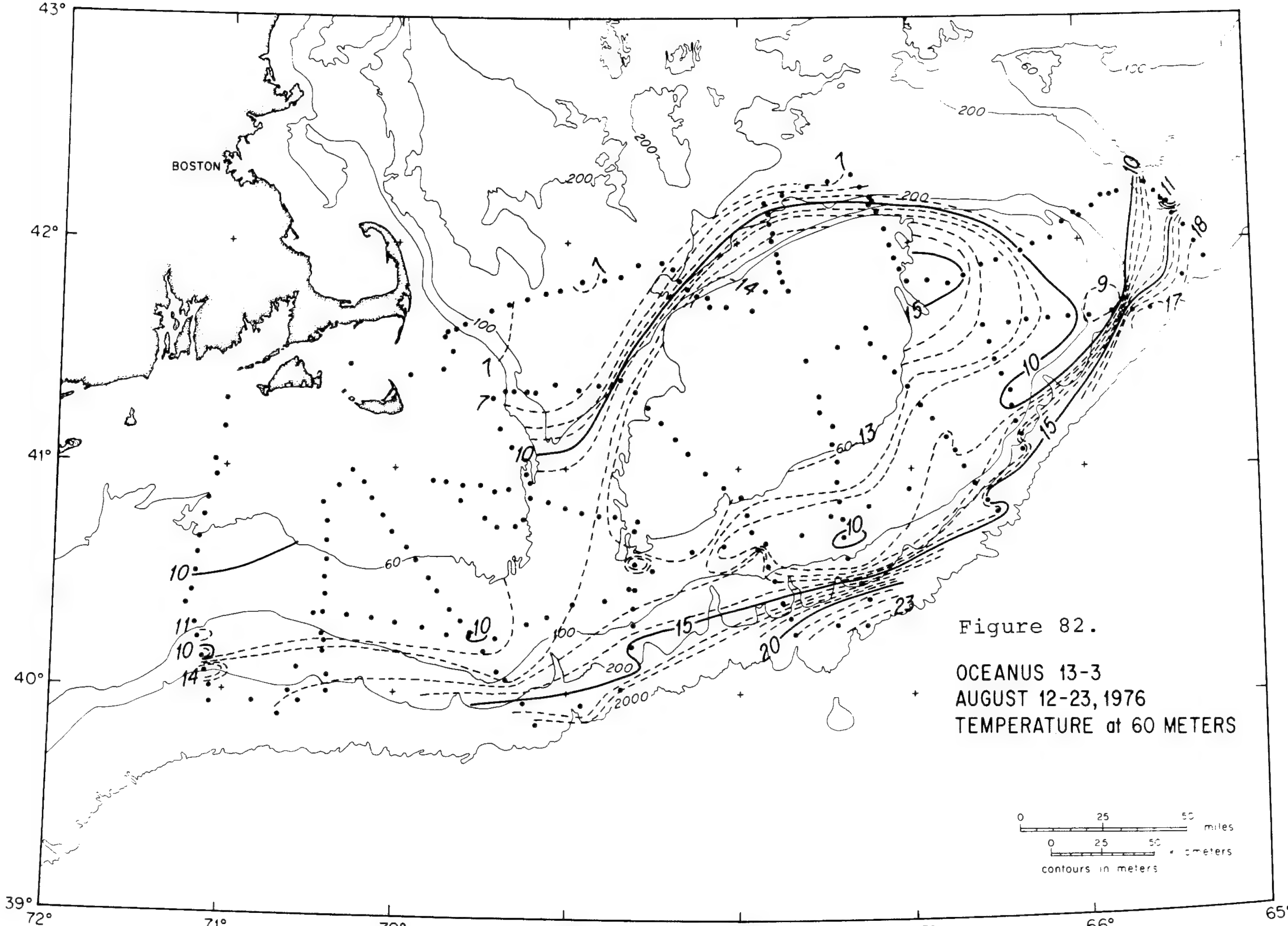


Figure 82.

OCEANUS 13-3
AUGUST 12-23, 1976
TEMPERATURE at 60 METERS

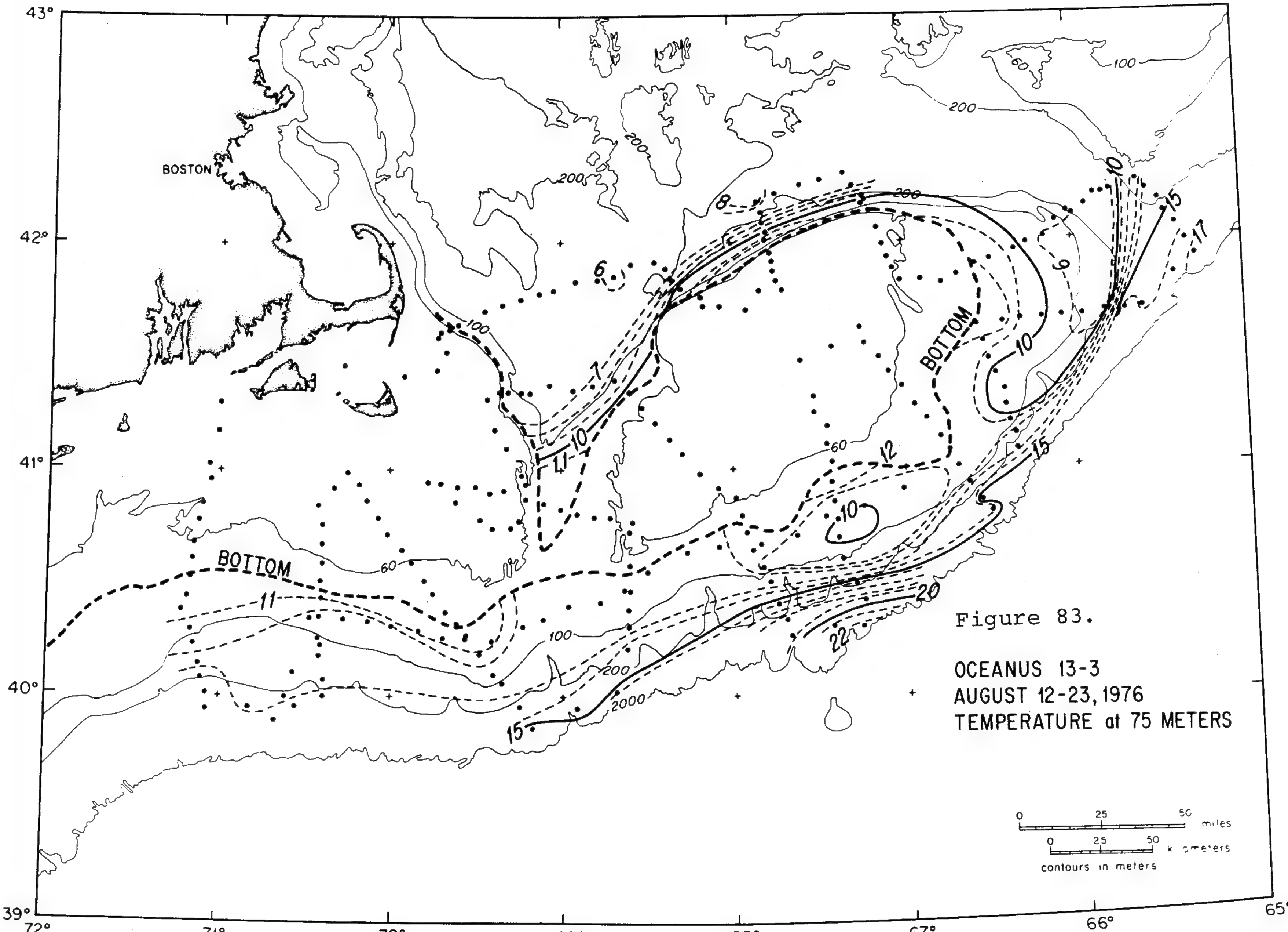


Figure 83.

OCEANUS 13-3
AUGUST 12-23, 1976
TEMPERATURE at 75 METERS

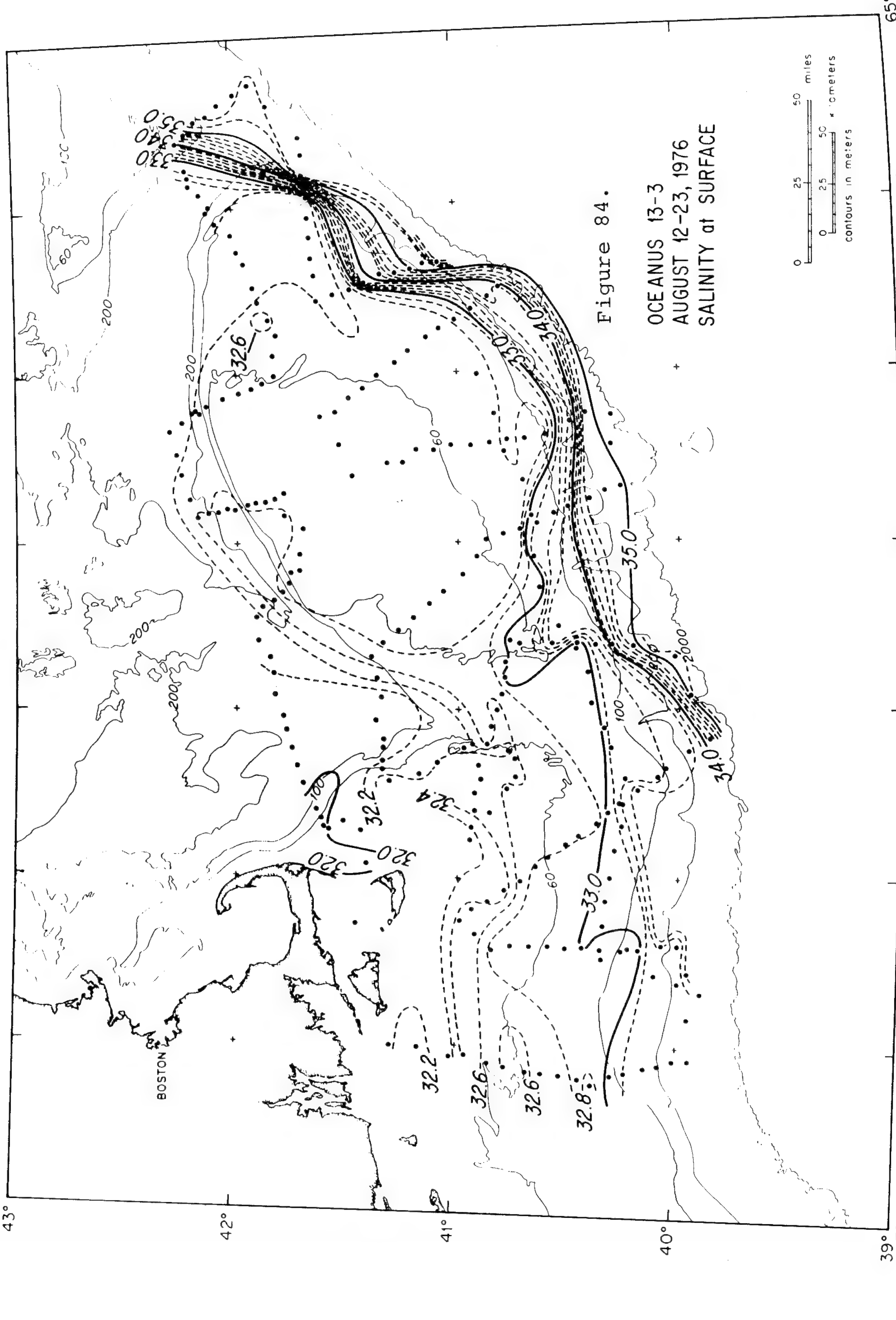


Figure 84.

OCEANUS 13-3
AUGUST 12-23, 1976
SALINITY at SURFACE

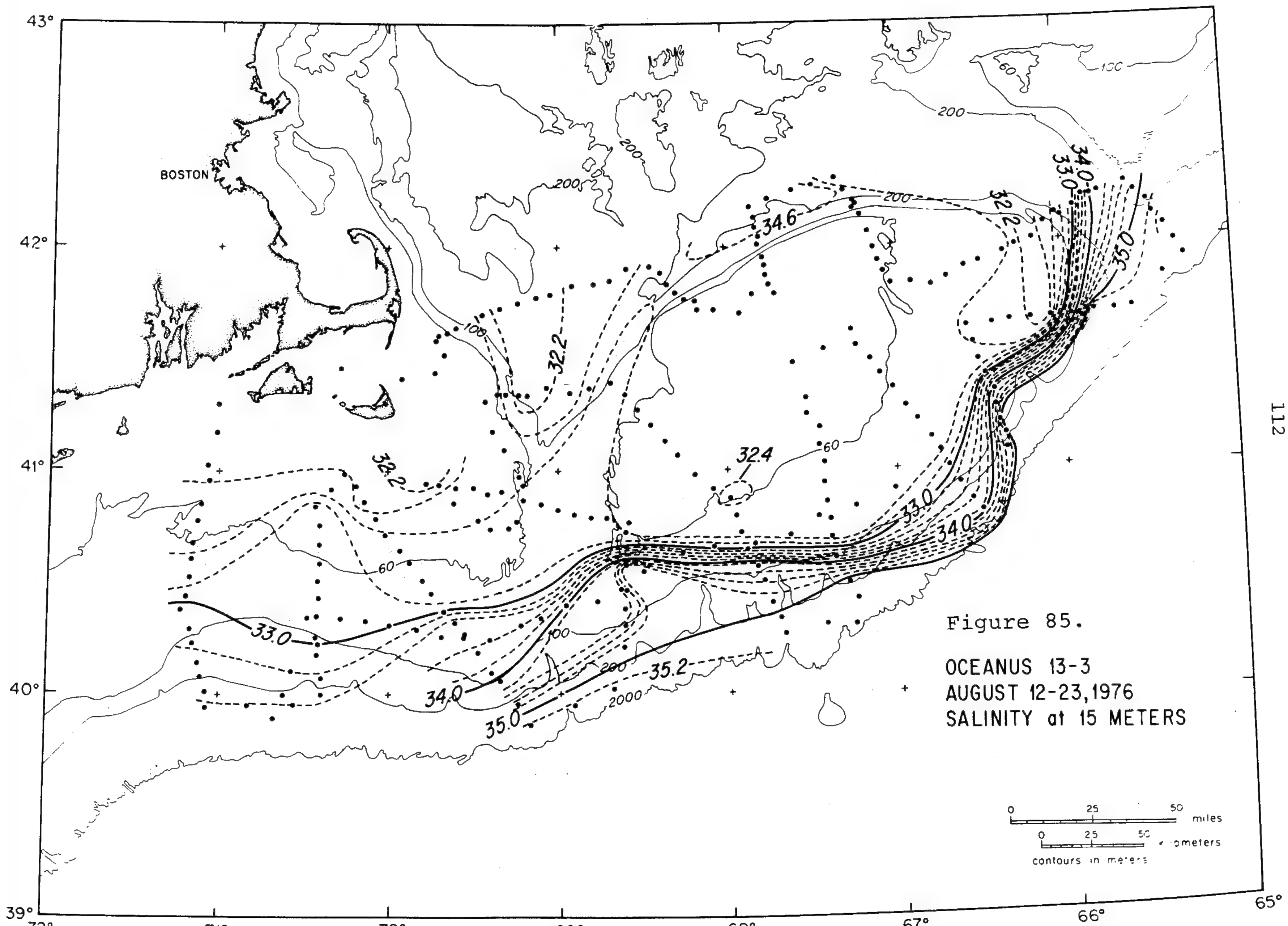


Figure 85.

OCEANUS 13-3
AUGUST 12-23,1976
SALINITY at 15 METERS

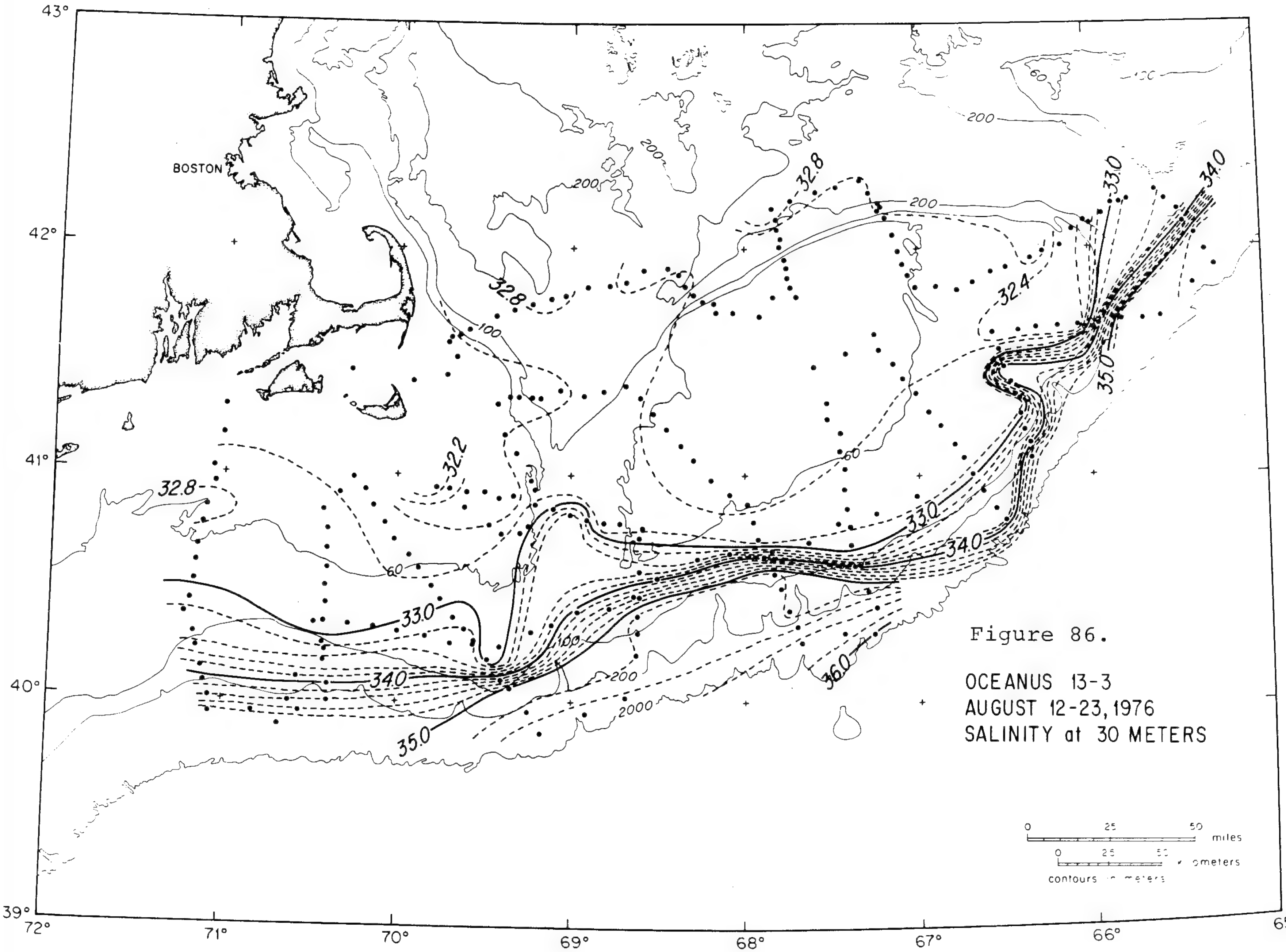


Figure 86.

OCEANUS 13-3
AUGUST 12-23, 1976
SALINITY at 30 METERS

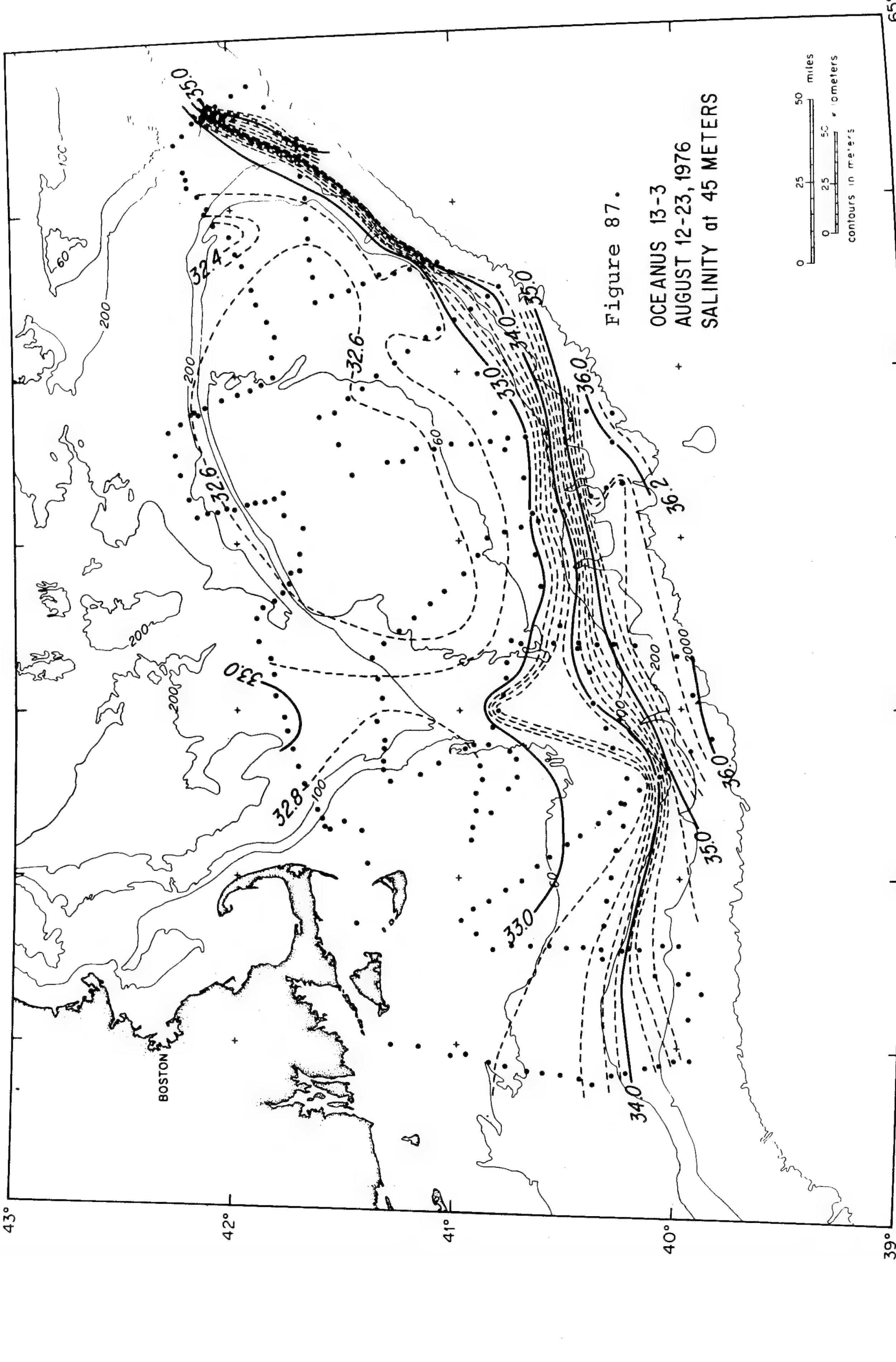


Figure 87.
OCEANUS 13-3
AUGUST 12-23, 1976
SALINITY at 45 METERS

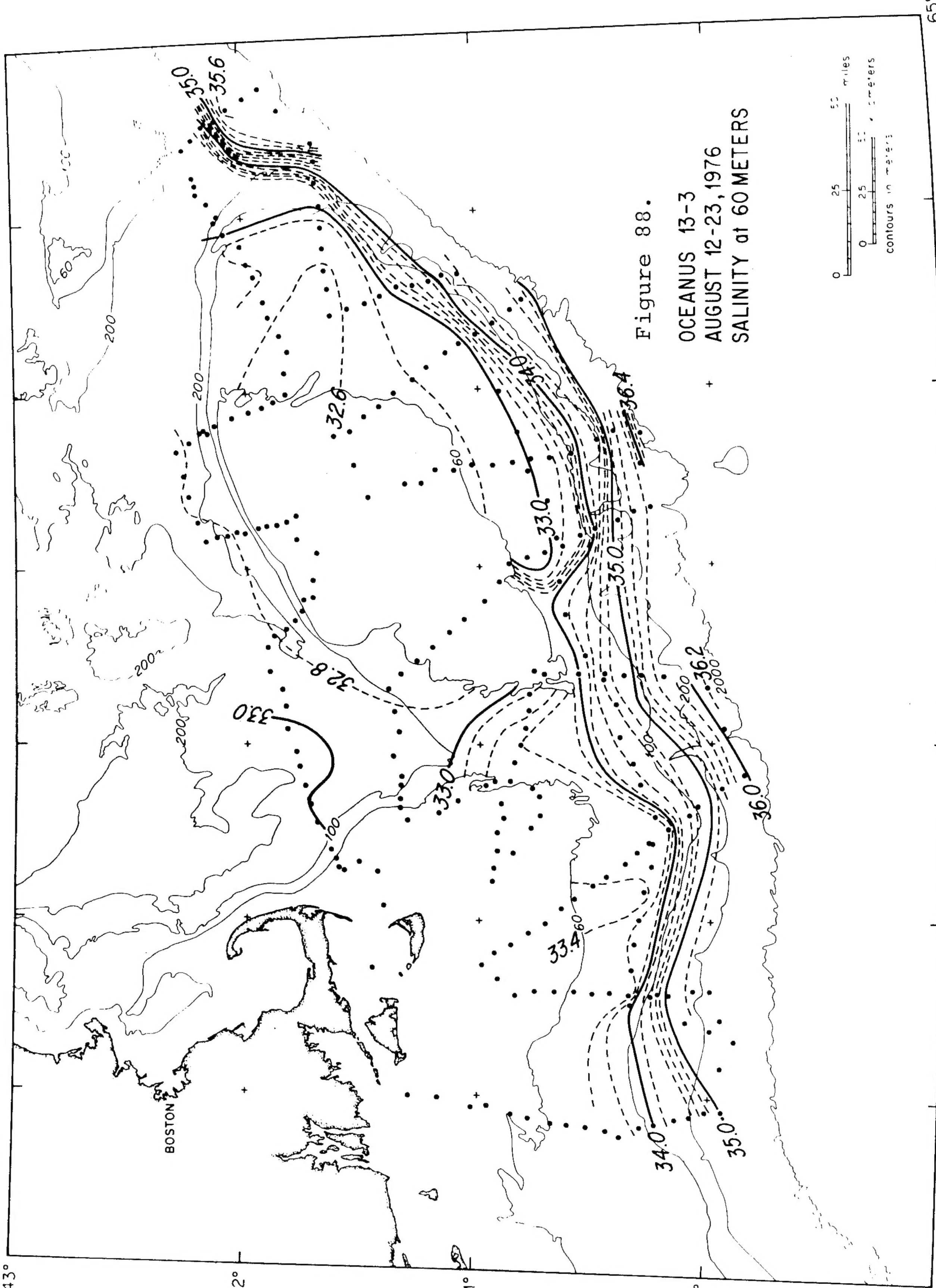


Figure 88.

OCEANUS 13-3
AUGUST 12-23, 1976
SALINITY at 60 METERS

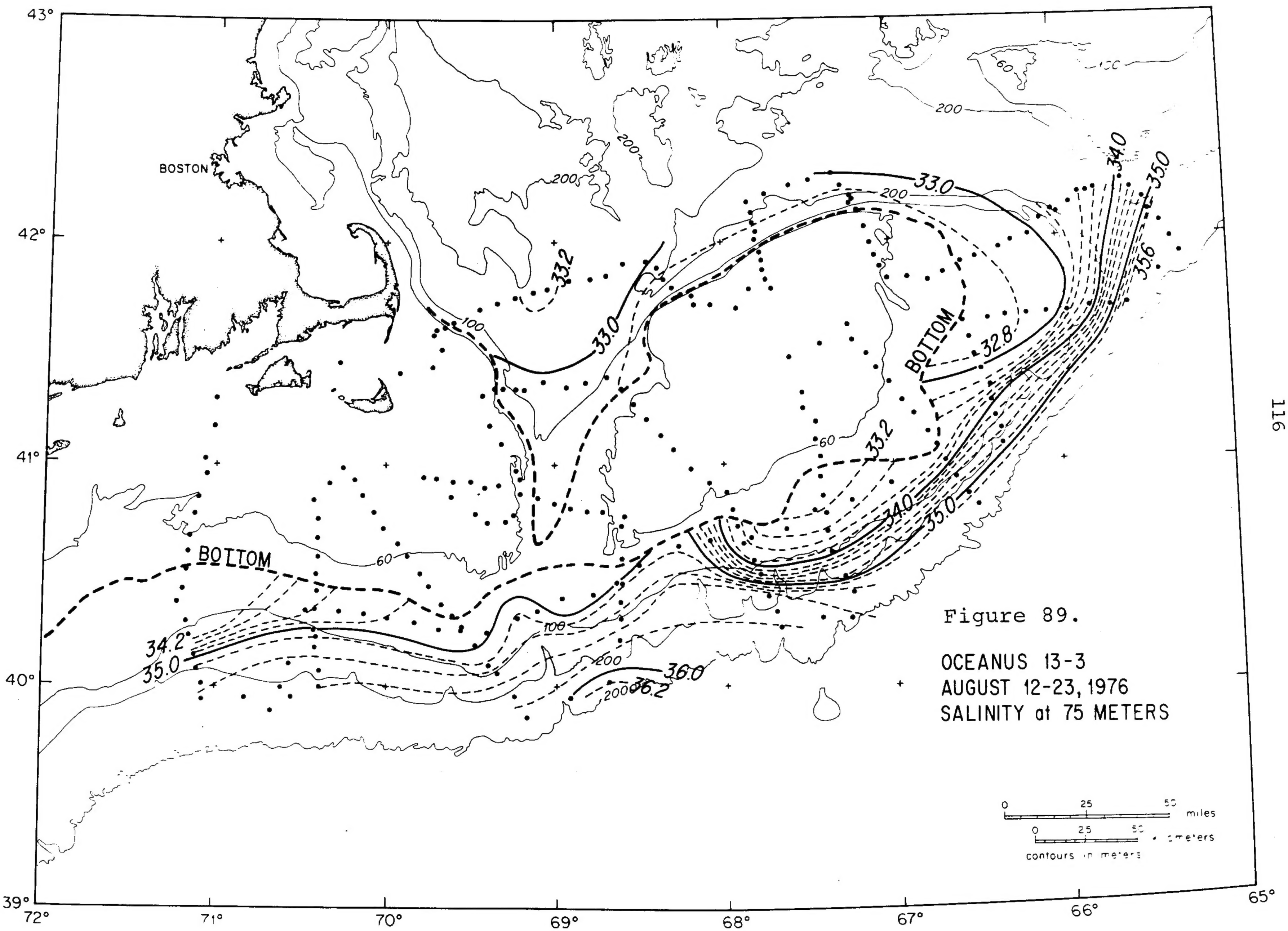


Figure 89.

OCEANUS 13-3
AUGUST 12-23, 1976
SALINITY at 75 METERS

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6.

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3. Gulf of Maine

17b. Identifiers/Open-Ended Terms

17c. COSATI Field/Group

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